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Cities and Economic Decline:
The Role of Foreclosures as a Stressor

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Cities and Economic Decline:
The Role of Foreclosures as a Stressor

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Abstract

Cities and Economic Decline:
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In the midst of the Great Recession, cities across the country were impacted in a variety of ways, and most saw rapid increases in foreclosures. This report uses a conceptual framework composed of three elements, stressors, vulnerability, and resiliency, to look at the implications of foreclosures for cities. First, factors that cause foreclosures in the 100 largest Metropolitan Statistical Areas are examined. Then this report looks specifically at the economic impact of foreclosures. Using multiple regression analyses, the findings suggest that foreclosures have negative economic impacts and can be considered a stressor on a city's economy. The application of this stressor has implications for a city's vulnerability and resiliency. To some extent, local authorities have limited authority and capacity to prevent foreclosures. Therefore, this report also explores alternative approaches that cities can take to increase economic resiliency and competitiveness in the context of stressors such as foreclosures.

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Chapter 1: Cities and the Housing Market

Between December 2007 and June 2009, the United States entered an economic downturn known to some as the Great Recession. Unlike prior recessions, the Great Recession was more severe and its implications were more widespread and damaging.[1] Unemployment rates soared, the financial sector collapsed, consumer spending and confidence plummeted, and with the collapse of the housing market, many families lost their homes. The collapse of the housing sector had ripple effects in the economy, and one of the goals of this report is to understand how foreclosures impacted the economy of cities.

Cities are particularly important because they are critical drivers of economic growth, and are also closely linked to national economies. In addition to providing a variety of public services, cities are responsible for a disproportionately large share of economic production. In 2012, for instance, a mere 19 percent of the global population lived the largest 300 metropolitan economies.[2] But these 300 metropolitan economies produced 48 percent of global GDP.[3] In this country, McKinsey & Company estimates that in 2010, nearly 85 percent of GDP was generated in 259 large cities across the U.S.[4] Furthermore, in some states, cities account for the majority of economic output.[5]

Boston, MA is one such example. Its economy is driven by an abundance of universities, a large tourism sector, and numerous medical facilities. The technology sector also has a large presence, partly due to the concentration of universities in the area. These sectors are sources of economic growth and employment, and it is not uncommon for people from the neighboring state of New Hampshire to commute to Boston for employment opportunities, indicating that the city and the economic opportunities it provides are vital to the surrounding region.

Given the economic importance of cities, it is important to understand how they fare when they experience an economic jolt. In the aftermath of the Great Recession and the collapse of the housing industry, cities across the country saw increasing foreclosures. States such as Florida, Arizona, and California were among the most severely impacted, and cities and neighborhoods that once thrived were no longer vibrant communities. Instead, houses were boarded up and vacated. Across the country, these properties were not maintained, and neighborhoods and cities began to decline. Entire neighborhoods became "ghost subdivisions," a term referring to abandoned, deserted neighborhoods filled with underwater or foreclosed homes.[6]

This chapter has three primary goals. First, an analytical framework will be developed. Next, a brief history of U.S. housing policy will be presented. This chapter concludes with an overview of the structure used in the rest of the report.

THE CONCEPTUAL FRAMEWORK: STRESSORS, VULNERABILITY, AND RESILIENCY

This report examines the economic impact of foreclosures in cities across the country, which can be explored using the closely related concepts of stressors, resiliency, and vulnerability. Times of crisis and economic instability make traditional urban economic frameworks less applicable. Thus, while this conceptual framework is not typically used in urban economics, it is illuminating because these three concepts allow us to consider how a city reacts, responds to, and recovers from an economic jolt.

In this report, an economic jolt such as a foreclosure can be considered a stressor on a city's economy. This concept of a stressor originates in the field of criminology and can be defined as "a sudden change in circumstances or environment that interacts with a complicated psychological profile in a way that leads a previously quiescent person to become violent."[7] Stressors do not by themselves cause crimes, but instead are one of a

multitude of important factors.[8] A foreclosure can be considered a stressor because a city's economy is a complicated entity with many different forces at work. Political, economic, social, and environmental decisions will all have impacts on a city's economy, and these forces interact in complex ways. Acting alone, a foreclosure may not have a significant economic impact. But when urban economies are already strained by an economic downturn, the impacts of a foreclosure may be more acute.

In the literature, vulnerability has been defined as "the exposure of an economy to exogenous shocks."[9] Vulnerability is based on the economic conditions within a city, and increased vulnerability can interrupt and prevent economic growth in cities. For the purposes of this report, vulnerability can be considered the degree to which a city is exposed to economic stressors. A city that is highly vulnerable may have difficulty recovering from a stressor, and the concept of resiliency focuses on this recovery.

The concept of resiliency originated in environmental fields, and refers to the ability to change and thrive in the face of unfavorable environmental conditions.[10] In an article titled *Resilience and Regions: Building Understanding of the Metaphor*, the authors discuss a few themes to clarify the term resiliency. First, the idea of an equilibrium is identified, referring to the concept that a system either has or lacks the ability to return to a pre-shock state.[11] Another important part of resilience is path dependence, meaning that a series of decisions, made over an extended period of time, tend to force a system down a certain path, and as a result, the system's future can be more predictable.[12] Resiliency therefore explores how a city's economy responds to an economic stressor. A resilient and sustainable city will be able to withstand the impact of a stressor. When a resilient city is unable to avoid the impact of a stressor, it will at least be able to recover more quickly.

There are many types of stressors, and in the modern economy, a foreclosure may be considered an economic stressor. Introducing and applying a stressor can potentially place downward economic pressure on cities, and the application of a stressor may result in increased vulnerability and decreased resiliency. How do cities respond to the application of a stressor? This response has implications for economic resiliency and competitiveness. Ideally, a city is resilient enough to rapidly recover from or withstand stressors. This level of resiliency can promote long-term economic stability.

A BRIEF HISTORY OF U.S. HOUSING POLICY

The Great Depression can be considered an example of an extreme stressor. There were a variety of forces at work that contributed to the depression, such as the 1929 stock market crash, the failure of banks and the resulting loss of savings, and protectionist public policies. These forces interacted in complex ways with one another, and because U.S. economy was vulnerable to these forces, the country entered a severe economic downturn. Resiliency was also lacking, as evidenced by the prolonged duration of the Great Depression. It was not until President Franklin Roosevelt's New Deal and the U.S. entry into World War II that the economy fully recovered.

Initial federal government forays into housing policy began with the onset of the depression, and the collapse of the housing market. Before this time, mortgages and the housing sector were generally under the purview of private markets.[13] But by 1933, some estimates suggest that there were over 1,000 foreclosures per day.[14] The rapidly increasing foreclosure rate resulted in market failures across the housing market, the financial market, and the economy in general.

To address this market failure, the federal government created the Federal Housing Administration (FHA).[15] While its role has changed over the twentieth century,

the FHA was originally created to restore confidence in mortgage lending by insuring mortgages.[16] A variety of other federal initiatives, such as the Federal National Mortgage Association (Fannie Mae), the Federal Savings and Loan Insurance Corporation, and the Reconstruction Finance Corporation were also created during this time period.[17] The goals of these programs were to make the housing market more dependable and resilient, and they also provided support for the construction and real estate industries.[18] By providing support for the construction industry and stabilizing the housing market, federal officials hoped to spur economic recovery.[19]

A significant piece of federal legislation was the 1949 Housing Act, which aimed to provide adequate housing for the entire US population. It also contained provisions to support urban redevelopment initiatives and bolster existing housing programs.[20] The theme of expanding homeownership is one that continues to resonate throughout the history of American housing policy. In 1969, the Fair Housing Act was passed, which attempted to deal with discrimination in the housing market by making it illegal to deny housing on the basis of race, religion, or ethnicity.[21]

In 1977, the Community Reinvestment Act was passed in an attempt to reduce red-lining. The act encouraged financial institutions to serve their entire communities, including low-income areas.[22] This was a problem in Atlanta, GA, and many other cities across the country, where banks displayed discriminatory lending practices by making lending decisions on the basis of race. Banks were more likely to reject loan applications from African Americans, and were less likely to approve African American mortgage applications when the applicants were considering home purchases in predominately white neighborhoods.[23] To some extent, all of these laws experienced inadequate enforcement, but they had the overall effect of expanding access to mortgage credit.[24] Expanding access to mortgage credit allowed more people to purchase homes. But as will

be discussed in more detail later, expanding credit access also means that lending criteria was relaxed.

Prior to the 1980s, states had some regulatory authority for mortgages and other financial instruments. During the 1980s, as increasing numbers of savings and loans corporations went bankrupt, the federal government preempted state regulatory authority.[25] Ultimately, this lead to the nationalization of housing finance, and the power of state governments was curtailed. But the regulatory structure at the federal level was inadequate, and coupled with weakening state regulatory mechanisms, the volume of subprime mortgages grew dramatically.[26] As will be explored later, subprime loans have a higher probability of foreclosure, and may be a source of vulnerability for cities.

The Clinton administration played a significant role in expanding home ownership by establishing a goal of achieving a 67.5 percent national homeownership rate by 2000.[27] The Clinton administration strategy did not require new legislation or initiatives, but instead relied on encouraging homeownership in groups with traditionally low homeownership rates, and also by more aggressively enforcing existing housing and banking laws.[28] The details of the Clinton administration's plans were presented in the National Homeownership Strategy. This policy initiative suggested a partnership between governments of all levels, private actors, nonprofits, and community groups.[29] Critical elements of the strategy address housing financing, production, building communities, opening markets, homeownership education and counseling, and raising awareness.[30] The Clinton administration achieved its goal, and the Bush administration also encouraged homeownership by directing the U.S. Department of Housing and Urban Development to focus its efforts specifically on low income and minority groups.[31]

One of the main reasons that the federal government promotes homeownership is because it is a method of wealth accumulation. Even if housing prices are in decline, a

homeowner who is making regular mortgage payments will pay down their mortgage and build equity.[32] The federal government encourages homeownership through the home mortgage interest deduction, and homeowners receive tax deductions based on the size of their house.[33]

The emphasis on homeownership encouraged the proliferation of subprime mortgages. Some federal initiatives emphasized homeownership specifically for low income and minority groups. In some instances, these borrowers were unable to meet the qualifications for prime mortgages, and lenders resorted to subprime mortgages instead. As will be discussed in more detail later, subprime mortgages, which can increase a city's vulnerability, have a higher likelihood of resulting in foreclosures. By early 2006, as the housing market began to decline, many state and local markets saw marked increases the amount of subprime foreclosures, although this timeline changes slightly depending on a city's age.[34] By the middle of 2007, most cities across the US were experiencing increasing foreclosures and mortgage delinquencies.[35] This accumulation, which may decrease a city's resiliency, was exacerbated by the onset of the Great Recession in December 2007.

A foreclosure occurs when a homeowner falls behind on mortgage payments. After 90 days without receiving a payment, the mortgage is considered seriously delinquent, at which point the lender typically initiates the foreclosure process.[36] The specific foreclosures process is determined by state law. There are two main foreclosure processes. Judicial foreclosures occur when a foreclosure is adjudicated through the court system.[37] Statutory foreclosures occur when the foreclosed property is auctioned off at the lender's discretion.[38] On average, researchers have found that judicial foreclosures take five months longer than statutory foreclosures.[39] In some states, the foreclosure process entails a final step, known as the post-sale redemption. This is the final

opportunity for homeowners to avoid a foreclosure, and the sale of the house to another party is conditional on the failure of this final step.[40]

THE CAUSES OF FORECLOSURES

Numerous studies have explored factors that contribute to foreclosures, and the research points to three main explanations: decreasing housing prices, weak regional economies, and increasing percentages of new, yet risky, financial instruments used to finance home purchases.[41] The majority of the research analyzes foreclosures at either the state or city level; in general, there are few studies addressing foreclosures at the national level.

In Massachusetts, there was a large increase of foreclosures in 2006 and 2007, which researchers at the Federal Reserve Bank in Boston attribute to the 2005 decline in housing prices.[42] They find that houses whose prices decline by 20 percent or more are 14 times more likely to default on a mortgage compared to houses whose value increased by 20 percent or more.[43] The relationship between housing value and the probability of defaulting has been confirmed by other studies. These findings suggest that perhaps foreclosures act as a stressor on housing values, and with the application of this stressor, cities face vulnerabilities such as declining home values.

Weak regional economies contribute to foreclosures, and studies have shown a statistically significant relationship between unemployment rates and foreclosure rates.[44] This finding supports the claim that foreclosures can negatively impact the economy, and also provides support for the theory of foreclosures as an economic stressor. However, to some extent the relation between unemployment rates and foreclosures depends on the type of MSA being examined. Cities with traditionally weak markets, (measured by unemployment rates) such as Detroit, MI and Indianapolis, IN, tend to experience higher

foreclosure rates.[45] High unemployment rates might possibly be a vulnerability that makes cities more susceptible to increased foreclosure rates. But it is possible that foreclosures might contribute to high unemployment rates (used as a measure of economic vitality), and the economic health regression model presented in Chapter 5 addresses the nature of the relation between the economy and foreclosures.

Research in cities such as Chicago, Atlanta, and Baltimore indicate that increases in foreclosures corresponded to increases in subprime lending rates.[46] Subprime mortgages were initially offered to homeowners as a means of promoting homeownership to those who could not participate in the prime mortgage market. Subprime mortgages are predatory loans because they take advantage of borrowers, for instance by penalizing homeowners for obtaining better loan terms if their credit improves.[47] One option for increased resiliency might be to better regulate subprime lending. But as will be addressed in Chapter 6, because housing finance regulation occurs at the national level and local authorities have little impact on federal regulations, this be may a source of increased vulnerability.

Socio-economic factors are also known to impact foreclosure rates. For instance, neighborhoods with high portions of African Americans and neighborhoods experiencing racial shifts are likely to have higher foreclosure rates, because these groups are more likely to finance home purchases with subprime mortgages.[48] Other factors such as income and education also impact foreclosure rates.

THE EFFECTS OF FORECLOSURES

The impact of foreclosures is affected by a city's resiliency. Resilient cities may be able to avoid the worst impacts of foreclosures, and may also recover at a faster rate. An analysis of foreclosures in Chicago shows that foreclosures of single-family houses

result in a 0.9 percent drop in housing values of nearby single-family houses.[49] (Less conservative estimates put this figure slightly higher at 1.136 percent.)[50] The study concludes that foreclosures in 1996 and 1997 in Chicago had a "cumulative impact" of anywhere between 598 million and 1.39 billion dollars.[51]

Foreclosures also have impacts for local governments. Foreclosed properties require maintenance to prevent decreasing property values in the surrounding area, and in some instances, local authorities have assumed maintenance responsibilities. But this can be an additional financial burden for cities, and cities have taken creative steps to address this issue. For example, the city of Chula Vista, CA has adopted an abandonment clause. Upon initiating the foreclosure process, the lender must register all vacant properties with the city, and the lender is also responsible for the property's maintenance.[52] This approach places the financial burden of maintenance on lenders and not cities.

Also, because foreclosed properties contribute to declining property values, a city's tax base would decrease. But foreclosed properties still rely on public services, such as fire and police departments. Detroit, MI has high foreclosed and abandoned property rates. The city is also experiencing severe financial problem. In extremely distressed neighborhoods, Detroit has reduced public services such as trash collection, and struggles with the question of how to balance the costs of service delivery while simultaneously ensuring "a baseline quality of life" for its citizens.[53]

In addition to the financial costs of foreclosures, there are also social costs. Foreclosures can result in abandoned and vacant buildings, and also possibly harbor gangs and criminals. Baltimore, MD is known for its problems with abandoned properties. Numerous neighborhoods are filled with boarded-up houses, and surrounding neighborhoods face increased crime and poverty rates. Businesses in these areas also tend to fail or move to a different location, causing economic distress in the neighborhood.

Foreclosures may be a stressor that exerts a downward economic pressure for cities by reducing the value of assets and by preventing opportunities for asset value realization. This can result in decreased resiliency and increased vulnerability for cities. However, local authorities have limited options to avoid or reduce foreclosures because many of the regulatory and policy options available are not accessible to subnational governments. When confronted with a substantial stressor such as a foreclosure, what can local authorities do? One possible approach is to consider alternative mechanisms for economic revitalization, and these options will be discussed in Chapter 6.

CHAPTER OVERVIEWS

The next chapter examines the literature surrounding the economic recession and places the foreclosure crisis within the context of the Great Recession. In addition to exploring the economic growth and decline of cities, this chapter considers how cities have fared during the recession. Cities faced decreased tax bases, and this increased source of vulnerability results in cuts to public spending and services. Chapter 3 discusses the data sources and the methodological approaches used for the analysis. Instead of focusing on a single city, this report takes a broader approach by examining cities across the country.

The research findings are presented in the next two chapters. Chapter 4 explores one of the main research questions: what factors explain the widely varying foreclosure rates across the country? To answer this question, a regression analysis referred to as the foreclosure prediction model is constructed. This analysis suggests that in addition to a variety of socio-economic characteristics, the foreclosure process is a significant factor. Chapter 5 addresses the second research question: what are the economic implications of foreclosures on urban economies? Again using a regression analysis, the findings indicate

that increasing foreclosure rates negatively impact economic growth. In addition, cities with growing economies should experience lower foreclosure rates.

Chapter 6 explores the public policy ramifications of the empirical analysis. It demonstrates that foreclosures are a stressor on a city's economy, and the application of this stressor causes increased economic vulnerability. A city may remain vulnerable to foreclosures because prevention measures are oftentimes beyond the capacity of local authorities. Given this predicament, Chapter 6 also explores alternative mechanisms to creating resilient urban economies to ensure economic stability.

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Chapter 2: Cities and Economies

Cities are drivers of economic growth, and it is important understand how they react during a period of economic decline. The growth or decline of cities can have implications not only for the city, but also for the surrounding region and the national economy. This chapter will first explore the factors impacting economic growth and decline. It will then discuss the onset of the Great Recession, and look at the various ways in which cities have been impacted.

THE CAUSES OF URBAN ECONOMIC GROWTH AND DECLINE

The economic base model emphasizes trade with other economic regions and points to exports as a city's main source of economic growth. A city will export goods that it specializes in, and as demand for these products increase, the level of exports (and income) from outside the city increases, thus stimulating economic growth.[1] Despite the limitations of this theory, on the basis of this model, cities might attempt to specialize their economy in goods that are in high demand as one way of avoiding the economic impacts of a stressor. For instance, Detroit and Pittsburgh specialized in the auto and steel industry, respectively. For a time, these cities prospered because of high external demand for these goods. But as will be discussed in Chapter 6, this strategy might be a source of increased vulnerability. Another instance of a specialization becoming a vulnerability can be seen in cities like Phoenix, AZ and Las Vegas, NV. These cities had economies that centered around the housing industry, and as will be explored later, this specialization and also large population increases were a source of rapid economic growth. But the housing market's decline and subsequent rise in foreclosures had a very negative impact for these cities.

In addition to the economic factors that contribute to urban growth, there are a variety of other elements to consider. One comprehensive study by Edward Glaeser and Jesse Shapiro examines growth in the 275 largest MSAs in the U.S. over two time periods, 1980 to 1990 and 1990 to 2000. Using the log of population as their dependent variable, the authors create four groups of independent variables. The first group includes the basic control variables, such as regional binary variables and the median population age. The second group, the density related variables, includes measurements such as the overall population, population density, and the percent of the population taking public transportation to work. The third group pertains to the weather. The final group encompasses human capital variables, and captures measurements such as education, income, and poverty. The vast majority of these variables are statistically significant.[2] Among other findings, the authors conclude that cities with greater human capital experience high growth rates.[3]

Other studies confirm that cities with more educated populations grow faster than comparable cities with lesser educated populations. In particular, the researchers focus on the share of the population with a bachelor's degree. They find that education, and the skills that educated workers have predicts productivity growth of a city.[4] Cities with highly skilled populations are not growing because they are attractive places to live, but because they are becoming increasingly economically productive.[5]

However, other studies find that the percent of the population graduating from high school or the percent of the population with some college education has a large effect on economic growth. The percent of the population graduating from college is of lesser importance, indicating that the overall education level of a population is important, not simply education at the higher levels.[6]

Another strand of research explores employment growth rates, which is one measure of economic growth, in a variety of industries. Researchers find that while regional demand for goods and comparative advantages can explain some of the employment trends, some of the explanation can also be attributed to the Marshall-Arrow-Romer externality.[7] It is advantageous for firms in the same industry to concentrate in the same city because knowledge sharing becomes easier, which stimulates innovation, industry growth, and efficiency.[8]

One point that the literature fails to satisfactorily explain is how and why a specific city gets on the path to specializing in a certain industry. For example, why is the entertainment industry located in Los Angeles? Urban economists typically resort to either very specific explanations (for instance arguing that the entertainment industry in Los Angeles is concentrated there due to good weather), or very generalized ones (such as a favorable business climate).[9]

Under normal economic conditions, the factors discussed above should cause urban economies to grow, or at least sustain constant levels of economic growth. But this report focuses on a city's economy during a recession. The following sections briefly explore the origins of the recession, and then focus on how cities were impacted.

CAUSES OF THE RECESSION

The housing bubble is one of many important factors that contributed to the economic downturn. The housing bubble was created partly by low short-term interest rates, which allowed homeowners to make lower monthly mortgage payments even as housing prices continued to rise.[10] Low interest rates also encouraged the proliferation of adjustable rate mortgages. As the housing bubble grew, a homeowner's income could not keep pace with the rapidly increasing housing values. Therefore, many mortgage

companies began issuing adjustable rate mortgages, which allowed for lower monthly payments initially, but are also associated with higher foreclosure rates.[11]

Low short-term interest rates also encouraged leveraging by allowing borrowed money to be invested in the market. Since there was more financial capital in the system, housing prices increased. When the housing bubble burst, the impact was more severe and had greater repercussions due to the excess financial capital.[12]

As mentioned earlier, the relaxation of lending standards meant that those who would otherwise not have qualified for mortgages under normal lending criteria obtained mortgages. Government regulations played an important role in the relaxation of lending standards. For example, the 1995 Community Reinvestment Act enacted new lending requirements for banks. One way for banks to meet these new standards was to increase lending to low-income or minorities.

But because these borrowers lacked the necessary credit scores and other perquisites for prime mortgages (defined as mortgages with favorable financial terms), many were instead issued subprime mortgages. Subprime mortgages have interest rates that are between three and five percentage points higher than prime mortgages. In addition, while the length of both prime and subprime mortgages is 30 years, the interest rate of a subprime mortgage interest rates are typically fixed for only two years, leaving homeowners exposed to fluctuating interest rates for the remaining 28 years.[13] Subprime mortgages may offer low initial interest rates, but during the remaining years interest rates can rise quite substantially, which homeowners may be unable to manage.[14] Subprime mortgage markets also typically face less federal regulation than prime mortgage markets.[15] This allows for the possibility of deceptive and fraudulent lending practices.

Once the housing bubble burst, housing prices began to fall sharply. Homeowners, especially those with less favorable mortgage terms, were unable to make mortgage payments when their interest rates rose.[16] At the same time, they could not refinance their house because the decreasing value of their home meant that they had negative equity.[17] That is, the house was now worth less than what the homeowner owed. As a result, foreclosures occurred at increasing rates.

In March 2008, the financial sector began to collapse, in part because this sector had heavily invested in mortgages that were now underwater. Investment banks such as Bear Stearns and Lehman Brothers failed. Government funds were used to bail out Fannie Mae and Freddy Mac, on the grounds that they were essential to ensuring that mortgage markets continued to function.

Further complicating this situation and exacerbating the economic recession was a tightening credit market. Banks and financial lenders were reluctant to lend capital to businesses. Both small and large businesses were impacted by tightening credit markets, but credit lines improved at a slower rate for small businesses.[18] This is problematic because, according to the Federal Reserve, small businesses (defined as those with less than 500 employees) "accounted for nearly 80 percent of total covered sector employment and over 70 percent of first-quarter payroll."[19] Thus, these types of businesses can be considered drivers of economic growth, and their sluggish recovery has hindered economic recovery and growth for cities.

As a result of these and other circumstances, the country entered a steep economic decline, and no single explanatory factor is completely responsible for the economic downturn. The foreclosure crisis may be considered a stressor that interacted with other explanatory factors and contributed to the recession. In an attempt to understand the causes of the economic crisis, the US Senate Permanent Subcommittee on

Investigations in 2011 released a report that concluded "the crisis was not a natural disaster, but the result of high risk, complex financial products; undisclosed conflicts of interest; and the failure of regulators, the credit rating agencies, and the market itself to rein in the excesses of Wall Street."[20] Within this context of steep economic decline, the median American family lost about 40 percent of its wealth.[21] The loss of wealth is just one of the many impacts of the recession.

IMPACTS OF THE RECESSION

A common method of measuring economic health is the unemployment rate. In December 2012, the unemployment rate was 7.8 percent.[22] This rate is higher than the highest unemployment rate after the 2001 recession.[23] However, unemployment rates do not capture people have left the labor force. Economists have calculated that the number of people absent from the labor force is about four million.[24] If these people were in the labor force (and they would presumably be unemployed), the unemployment rate would be closer to 10 percent.[25]

Another method of measuring the impact of the recession is to examine what economists call the "jobs gap." This is a measurement of the number of jobs necessary to restore the U.S. labor market to pre-recession levels.[26] The current jobs gap is 9.1 million jobs.[27] According to the Economic Policy Institute, this value is the combination of two numbers: the 3.4 million jobs lost during the recession, and the 5.8 million jobs that should have been, but were not, created to absorb the entry of new labor into the labor market.[28]

Compared to prior recessions, the Great Recession resulted in a much higher job deficit and unemployment rate. Recovery has been elusive due to the scope, severity and length of the Great Recession.[29] As the Economic Policy Institute succinctly concluded,

"the Great Recession has brought the worst of both worlds: extraordinarily severe job loss, combined with an extremely sluggish recovery."[30]

Of particular relevance is the recession's impact on state and city governments. Subnational governments are important actors because they are responsible for direct service provision to citizens and also determine spending on public goods.[31] As described earlier, state and local governments are economic drivers. According to the Brookings Institution, state and local governments together account for 12 percent of GDP, and employ one out of seven workers, which is more than any other industry, including the health care, retail or manufacturing sectors.[32] Subnational governments also generate demand for goods provided by the private sector, which causes economic growth.

Subnational governments are also economic drivers because of the public services they provide, such as Medicaid and unemployment benefits. Not surprisingly, as the recession continued, state and local governments faced increased demand from citizens for public services, but also faced decreasing revenue. 17 percent of the federal government's budget is allocated to state and local governments.[33] While states get additional revenue from income and sales tax, local governments rely primarily on property taxes.[34] As consumer spending dropped, but demand for services increased, subnational governments faced increasing budget deficits. The federal government responded to this shortfall through fiscal transfers and the 2009 American Recovery and Reinvestment Act. These unprecedented actions proved insufficient given the vast deficits that state and local governments faced. Some estimates suggest that between 2009 and 2012, states faced over $540 billion in budget deficits.[35]

For the majority of states, a balanced budget is constitutionally mandated. Instead of tax increases, many states resorted to spending cuts in sectors such as education, health care and human services.[36] In addition to providing fewer services for citizens,

employment in the public sector dropped. Because of these spending cuts, the public sector is hiring employees at lower rates, representing a drag on economic recovery that was not present in previous recessions.[37] From August 2008 to September 2012, state payrolls declined by 2.6 percent, and local payrolls declined by 3.3 percent; this represents 137,000 jobs and 437,000 jobs respectively.[38] This is problematic given earlier assertions of subnational governments as economic drivers.

Cities are engines of economic growth in the national economy, and have been severely impacted by the recession. There are numerous theories that describe how a city will economically grow. Some theories point to exports as source of economic growth, while others stress labor force education. These and other elements discussed in this chapter will serve as a foundation for Chapter 6, which explores steps cities can take to develop resilient and competitive economies.

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Chapter 3: Data and Methods

The empirical questions to be addressed in this report concern (1) the factors that explain foreclosure rates in cities and (2) the effect of foreclosure rates on urban economies. What factors explain why the Austin-Round Rock, TX, MSA has an extremely low foreclosure rate of 1.79 percent, while the Miami-Fort Lauderdale-Pompano Beach, FL, MSA has a foreclosure rate of 18.63 percent? There are a variety of factors, such as socio-economic characteristics, neighborhood qualities, and qualities of the housing stock that are expected to influence foreclosure rates. In addition, how do urban economies respond to foreclosures? Factors that impact economic conditions in cities include, but are not limited to, the labor force's educational attainment and the types of industries located in the city. The method adopted to answer these questions is multiple regression analyses using metropolitan statistical areas (MSAs) as the unit of analysis.

EXPLAINING FORECLOSURE RATES

Cities across the country have been impacted by foreclosures, although the impact varies dramatically. Because cities are the heart of modern economies, their response to economic stressors such as foreclosures is important to consider, especially during an economic downturn such as the Great Recession.

In the sample used in this report, the Austin-Round Rock, TX, MSA has the lowest foreclosure rate at 1.79 percent. The Miami-Fort Lauderdale-Pompano Beach, FL, MSA has a foreclosure rate of 18.63 percent, which is the highest foreclosure rate in the sample. Figure 1 details this variation.

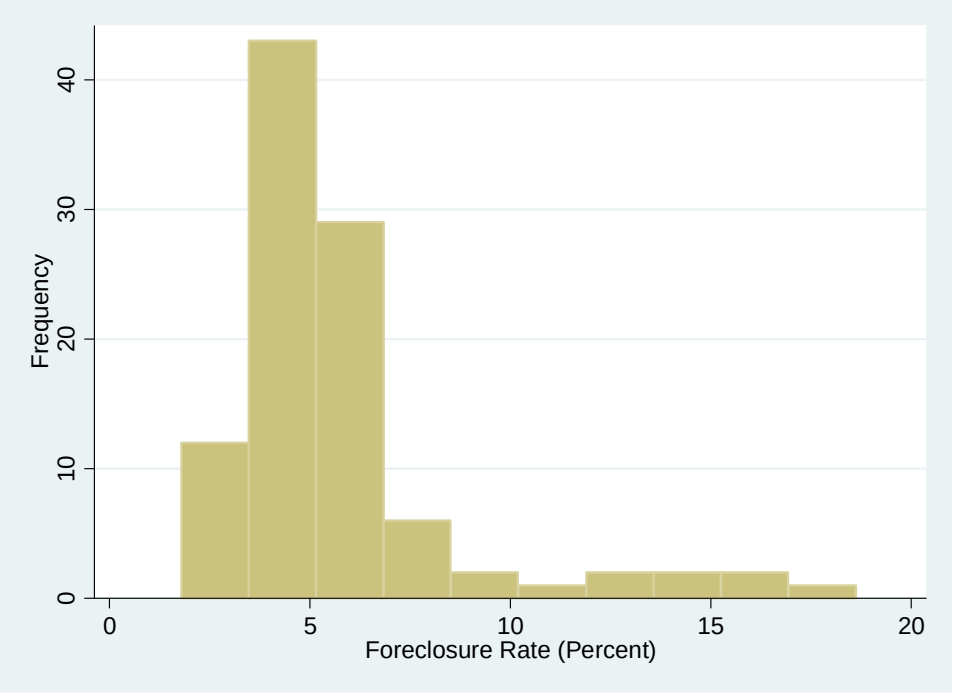

Figure 1: 2011 Foreclosure Rate Distribution Among 100 Metropolitan Areas

While there are many studies in the literature that explore the causes of foreclosures, these studies tend to focus on variation in foreclosure rates within a single city and use census tracts as the unit of analysis. This analytical approach has been used in cities such as Chicago, IL and Atlanta, GA. The drawback to this approach is that results are typically only generalizable to the city being analyzed. This report instead takes a larger focus and looks at the 100 largest MSAs in the country on the basis of population, thus allowing for the identification of national-level trends that explain foreclosures. The literature has also identified a variety of socio-economic, neighborhood, and housing characteristics that explain the widely varying foreclosure rates. Using these variables as a starting point, the foreclosure prediction model explores what causes a foreclosure at the MSA level.

According to the Office of Management and Budget, an MSA is defined as one or more counties with "at least one urbanized area of 50,000 or more population, plus adjacent territory that has a high degree of social and economic integration with the core as measured by commuting ties."[1] In this sample, the Chicago Chicago-Naperville-Joliet, IL-IN-WI is the largest MSA, and the Modesto, CA, MSA is the smallest. The populations of these two MSAs are 9,516,047 people and 166,136 people, respectively, indicating the heterogeneity of cities included in the sample. Geographically, almost a third of the sample (29 MSAs) are located in the Southeast region, based on the Bureau of Economic Analysis classifications. This region includes, but is not limited to states such as Florida, Virginia, and Louisiana (see Appendix A for more details).

The rationale for using the 100 largest MSAs as the sample is twofold. The 100 largest MSAs contain about 54 percent of the total U.S. population.[i] Because the majority of the country's population lives in these MSAs, this sample is an inclusive and representative one. In addition, data availability were an ongoing source of concern. At the MSA level, data were most readily available for the 100 largest MSAs, making this sample a logical and convenient choice. One problem with using MSAs as a measurement unit is that the city center is not separated from the surrounding suburbs. The literature is inconclusive on whether center cities of suburban jurisdictions experience higher foreclosure rates, but it would not be surprising to find some differences between the two areas.

[i] The total population in the 100 largest MSAs is 169,093,763. 2011 Census Bureau estimates of the US population is 311,587,816. See http://quickfacts.census.gov/qfd/states/00000.html for more information.

THE METHODOLOGY AND CONSTRUCTION OF THE FORECLOSURE PREDICTION MODEL

The equation developed for the foreclosure prediction model explains the foreclosure rate variation using regional binary variables, a binary variable indicating the foreclosure process, and three sets of variables capturing the financial/socio-economic (F/SE) of homeowners, housing (H) characteristics, and neighborhood qualities (N). The variables for this analysis are described below, and are also shown in Table 1. The equation for the foreclosure prediction model is:

1) Log FCRate = f [(Regional Binary Variables), (TypeFC), (F/SE), (H), (N)]

The dependent variable was obtained from Foreclosure-Response.org, an online resource developed by Center for Housing Policy, the Local Initiatives Support Commission, and the Urban Institute.[2] The foreclosure rate of an MSA comes from examination of LPS Applied Analytics data by the Local Initiatives Support Council, and was tabulated by the Urban Institute.[3] The rate of foreclosures is defined as the number of mortgages that are "in foreclosure relative to active first-lien mortgages."[4] The data for this variable were available at four different points during 2011: March, June, September, and December. However, the data for all other variables were only available at one point per year. Thus, an average of the values from March, June, September, and December was taken to create a variable that represented the 2011 foreclosure rate, in an attempt to cover the same time span as all other variables.

Initially, the dependent variable for the foreclosure prediction model was the foreclosure rates (entered as a percentage) of an MSA. However, upon examining the residual plot for this variable, a transformation was required because the residuals had a distinct "U" shape (see Appendix B). This suggests a non-linear relationship between the

dependent and independent variables, and a transformation is required to prevent model misspecification. Both a logarithmic and a square root transformation were attempted. In addition to being easier to interpret, the log transformation reduced more of the heteroskedasticity present in the model. Transforming the foreclosure rate into a log results in a log-lin model. The left-hand side of the equation is in log form, but the right-hand side is not, and the coefficients can be interpreted as semi-elasticitys of demand.

The Bureau of Economics divides the country into eight regions, and the regional binary variables were constructed on the basis of these regions. To avoid perfect correlation, region four was excluded because it had the lowest average foreclosure rate. See Appendix A for a table describing the regions and the average foreclosure rate in each region.

To construct the variable indicating the type of foreclosure, a Freddie Mac Working Paper, *Interventions in Mortgage Default: Policies and Practices to Prevent Home Loss and Lower Costs,* by Amy Crew Cutts and William A. Merrill was consulted. This variable is a binary variable. 1 indicates the state follows a judicial foreclosure process, and 0 indicates a statutory foreclosure process. 22 states use a judicial foreclosure process. Other states permit both procedures, but in these states, statutory foreclosures are much more common.[5] Because this variable is determined on the basis of state law, determining the value proved difficult when MSAs fell in two or more states with differing foreclosures processes. [ii] The value was ultimately determined on the basis of where the majority of the MSA's population lived.

[ii] To overcome this issue, documentation by the Office of Management and Budget (OMB), the federal agency that classifies MSAs and other geographical delineations was consulted. In OMB Bulletin No. 10-02, the agency lists the counties that compose each MSA. If an MSA crossed state lines, and the states had differing foreclosure processes, the state with the most counties was determined. The assumption behind this logic was that determining which state had the most counties would indicate where the majority of the population in the MSA lived, and thus the type of foreclosure process that the majority of the MSA's population faced. The Kansas City MO-KS MSA is an illustrative example. Missouri has a statutory

The data for the financial and socio-economic variables (F/SE) were taken from the Census Bureau using the American Factfinder. The data were from 2011. American Community Survey three year estimates were used because they are a balance between reliability and currency.[6] The data in this category include measures of income, education, poverty, and racial classifications. In some instances, 2011 data from the Census Bureau was not available for some MSAs. Instead of imputing missing values, 2009 data were used instead.[iii]

Similar to the F/SE category, the data for the housing qualities (H) variables were taken from the 2011 American Community Survey. These variables include measurements for housing size, property values, and the age of the housing stock.

The neighborhood (N) qualities variables were also taken from the 2011 American Community Survey. The variables in this category are the real estate tax value, along with control variables for the population and population change. Controlling for the population ensures that the effect of a city's size is held constant. Including a variable capturing population change is important because it accounts for the fact that not all cities are growing at the same rate. Those with higher population growth rates might experience higher foreclosure rates simply because there are more homeowners with newer mortgages in the city. Adding a variable to measure the population change accounts for this feature.

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foreclosure process, and Kansas has a judicial foreclosure process. However, this MSA is composed of six counties in Kansas, and nine counties in Missouri. Therefore, since more counties are located in Missouri, this MSA was deemed to have a statutory foreclosure process. An identical process was followed when determining the region for an MSA that fell in different states that were located in different regions.

[iii] 2009 data was used for the following MSAs: Austin-Round Rock, TX; Bakersfield, CA; Bradenton-Sarasota Venice, FL; Charlotte-Gastonia-Concord, NC-SC; Chicago-Naperville-Joliet, IL-IN-WI; Louisville Jefferson County, KY-IN; Orlando-Kissimmee, FL; Phoenix-Mesa-Scottsdale AZ; Portland-Vancouver-Beaverton, OR-WA; and San Antonio TX.

The table below includes a description of the variables included in the analysis. In the table, "level of analysis" refers to the geographical level at which the variable is measured. "Category of analysis" refers to three main categories mentioned earlier: neighborhood qualities (N), housing qualities (H), and financial/socio-economic (F/SE) qualities.

Variable Name	Definition	Source	Unit of Measurement	Level of Analysis	Category of Analysis
Logfcrate	The number of mortgages that are in foreclosure, relative to "active first-lien mortgages."[7] The log of this variable is used in the regression model.	LPS Applied Analytics data; tabulated by the Urban Institute.[8]	Percent	MSA	N/A (This is the dependent variable)
DVReg1—DVReg8	These binary variables represent the eight regions of the US.	US Bureau of Economic Analysis	Dummy variable	Regional	N/A
Typefc	This binary variable is coded 1 if the foreclosure process is judicial, and 0 if the state has a statutory process.	Freddie Mac Working Paper #08-01	Dummy variable	State	N/A
Unemployed	Percent of population that is unemployed	US Census Bureau	Percent	MSA	F/SE
BelowPovLine	Percent of families whose income is below the poverty line in the past 12 months	US Census Bureau	Percent	MSA	F/SE
MedIncome	Median household income	US Census Bureau	Numerical value	MSA	F/SE
MedianIncome WithMort	Median household income of owner occupied housing units for houses with a mortgage	US Census Bureau	Numerical value	MSA	F/SE
AfricanAmer	Percent of population that is African American	US Census Bureau	Percent	MSA	F/SE

Table 1: Variable Definitions and Sources for the Foreclosure Prediction Model

Table 1, Continued

DVHisp	Percent of MSA's population that is Hispanic. Coded 1 if the percentage was greater than or equal to 25 percent; 0 otherwise.	US Census Bureau	Dummy variable	MSA	F/SE
Bachelorsdegree	Percent of population age 25 or older with a bachelor's degree or higher	US Census Bureau	Percent	MSA	F/SE
Rooms	Median number of rooms	US Census Bureau	Numerical value	MSA	H
HouseValueWith Mort	Median house value for housing units with a mortgage	US Census Bureau	Numerical value	MSA	H
MedHouseCost	Median monthly housing cost	US Census Bureau	Numerical value	MSA	H
Sq1949	Percent of houses built in 1949 or earlier, squared	US Census Bureau	Percent	MSA	H
Sq1950	Percent of houses built between 1950 and 1969, squared	US Census Bureau	Percent	MSA	H
Sq1970	Percent of houses built between 1970 and 1989, squared	US Census Bureau	Percent	MSA	H
Sq1990	Percent of houses built after 1990, squared	US Census Bureau	Percent	MSA	H
MedTaxRate	Median real estate tax rate	US Census Bureau	Numerical value	MSA	N
Pop2011	Population in 2011	US Census Bureau	Numerical value	MSA	N
Popchange	Population change from 2005 to 2010	Calculated from US Census Bureau data	Numerical value	MSA	N

EXPLAINING THE ECONOMIC VITALITY OF CITIES

The dynamics at work in urban economies are complex. How does the introduction and application of a stressor like a foreclosure impact urban economies? The economic health model aims to answer this question. Some theories in the literature emphasize specialization, and suggest a city will export a good it specializes in, causing economic growth. Sectors with high multipliers also contribute to economic growth,

because these industries create jobs in other sectors. Other studies suggest that the labor force, and specifically its educational attainment, is a critical factor of economic growth.

There are numerous options to measure economic growth and decline. Unemployment rates are often used, but as discussed earlier, unemployment rates are misleading because they do not capture people who are no longer looking for employment. Another common approach is to use a city's population as a growth measure, but population changes do not capture the economic dimension this research question seeks to explain. The economic health model therefore uses employment rates as a measure of economic growth or decline. Using employment rates directly captures economic vitality by measuring the portion of the population participating in the labor force.

THE METHODOLOGY AND CONSTRUCTION OF THE ECONOMIC HEALTH MODEL

The economic health model looks at factors that impact urban growth and decline. For the purposes of simplifying the analysis, the independent variables were grouped according to the categories used by Edward Glaeser: human capital variables (H), density related variables (D), and control variables (C), Based on the literature, another category, called economic indicators (E), was created. Similar to the foreclosure prediction model, the unit of analysis for this model is an MSA. Table 2 contains a description of these variables. The equation for the economic health model is:

2) Employment Rate = f [(FCRate), (E), (H), (D), (C)]

Employment rates are used an instrumental variable to measure a city's economic growth or decline. An instrumental variable, or proxy variable, is a variable that is not of

direct interest, but is used to capture the effects of a phenomenon of interest. In this analysis, the variable of direct interest is not employment rates. Instead, on the basis of research reviewed in previous chapters, employment rates are used to capture economic growth or decline. One advantage of using an instrumental variable is that they are typically correlated with the independent variables, but not with the residual terms. The main shortcoming of this approach is that it can be difficult to find instrumental variables that adequately capture the characteristic of interest. Employment rates were obtained through the Census Bureau's American Factfinder, and similar to the previous model, three year estimates were used. Like the previous model, the values for the foreclosure rate variables originate from examination of LPS Applied Analytics data by the Local Initiatives Support Council, and were tabulated by the Urban Institute.[9]

The first category of independent variables, the economic indicators (E), include variables that measure state GDP levels, job creation in an MSA, export values, and the percentage of manufacturing jobs. State GDP levels were obtained from the Bureau of Economic Analysis. The source of all other variables in this category was the Brookings Institution's Metropolitan Policy Program. However, the most recent data available from Brookings were from 2010. Data for all other variables were from 2011, but despite this inconsistency, there is little reason to expect that the results of the analysis will be significantly inaccurate. In addition, the data from Brookings contained a few missing values and these were imputed for certain MSAs.[iv]

[iv] For the Bradenton-Sarasota-Venice, FL; Lancaster, PA; Lansing, MI; and Santa Rose-Petaluma, CA MSAs, the following variables were imputed: the export value of an MSA (the ExportValue variable) and the number of job supported by export sectors (the ExportProdJobs variable).
In addition, for the Brandenton-Sarasota-Venice FL; Lansing MI; Portland ME; and Santa Rosa-Petaluma, CA MSAs, the following variables were imputed: manufacturing jobs as a percent of all jobs (the Manufactjobs variable), the percent change in manufacturing jobs from 2000 to 2010 (the Changemanufactjobs variables) and the percent of manufacturing jobs considered very high tech (the Manufvhightech variable). The alternative to imputation is to drop the observation entirely from the

The second group of independent variables, the human capital (H) variables, capture labor force qualities that are likely to impact economic growth, such as poverty and education levels. The Census Bureau was the source of all variables in this category.

The density related (D) category includes three variables: the 2011 population, the change in population between 2005 and 2010, and the average commuting time to employment. Like the previous category, the data for this category were taken from the Census Bureau.

The final category of variables, the control variables (C) are included to account for the effects of income and race. Including these variables ensures that their effects are held constant across a sample of heterogeneous MSAs.

The table below describes the variables, their measurement units, and the source. "Level of analysis" refers to the geographic level at which the variable was measured, and "category of analysis" refers to categories discussed above.

analysis. Imputing is advantageous because it maintains the sample size. Because the imputed value is the mean of all available non-imputed data, the observation does not impact the portion of explained variation.

Variable Name	Definition	Source	Unit of Measurement	Level of Analysis	Category of Analysis
Employmentrate	Percent of population in the labor force that is employed	US Census Bureau	Percent	MSA	N/A (This is the dependent variable)
FCrate	The number of mortgages that are in foreclosure, relative to "active first-lien mortgages."[10]	LPS Applied Analytics data; tabulated by the Urban Institute.[11]	Percent	MSA	E
StateGDP	Total GDP of a state in 2011 (in current dollars)	Bureau of Economic Analysis	Millions of dollars	State	E
Manufactjobs	Manufacturing jobs as a percentage of all jobs	Brookings Institution	Percent	MSA	E
Manufvhightech	Portion of manufacturing jobs that are considered very high tech	Brookings Institution	Percent	MSA	E
Exportvalue	Export value of MSA	Brookings Institution	Billions of dollars	MSA	E
Exportprodjobs	"Jobs supported by exports in the industries producing the exported good or service."[12]	Brookings Institution	Thousands of jobs	MSA	E
Changemanufjobs	Percentage change in manufacturing jobs from 2000 to 2010	Brookings Institution	Percent	MSA	E
Belowpovline	Percent of families whose income is below the poverty line in the past 12 months	US Census Bureau	Percent	MSA	H

Table 2: Variable Definitions and Sources for the Economic Health Model

Table 2, Continued

Bachelorsdegree	Percent of population age 25 or older with a bachelor's degree or higher	US Census Bureau	Percent	MSA	H
Somecollege	Percent of population with some college, but no degree	US Census Bureau	Percent	MSA	H
Highschoolgrad	Percent of population that graduated from high school, (including equivalency)	US Census Bureau	Percent	MSA	H
Pop	2011 population	US Census Bureau	Numerical value	MSA	D
Popchange	Population change from 2005 to 2010	Calculated from Census Bureau data	Percent	MSA	D
Meantraveltime	Mean travel time to work	US Census Bureau	Minutes	MSA	D
Medincome	Median household income in 2011	US Census Bureau	Numerical Value	MSA	C
DVHisp	Percent of MSA's population that is Hispanic. Coded 1 if the percentage was greater than or equal to 25 percent; 0 otherwise.	US Census Bureau	Percent	MSA	C
AfricanAmer	Percent of population that is African American	US Census Bureau	Percent	MSA	C

This regression model most likely suffers from simultaneity since there may be mutual causation between employment rates and foreclosure rates. As the foreclosure rate in a city increases, a city may experience economic decline. Foreclosed properties could

exert a downward economic influence on an MSA because these properties contribute little to a city's tax base, but consume resources such as public services.

The relationship between foreclosures and employment rates may also work in the opposite direction. As economic conditions in an MSA decline and employment rates decrease, the foreclosure rate may increase because families lack the necessary income to make mortgage payments. Ignoring the mutual causation or simultaneity and using Ordinary Least Squares (OLS) to estimate the regression model may cause the coefficients to be unreliable. Regardless of the sample size, the coefficients will not be truly representative of the population coefficients.

In the presence of simultaneity, describing variables as independent and dependent becomes problematic since some variables are mutually determined. In these circumstances, a system of equations is developed to capture these complex relationships and variables are labeled endogenous and exogenous. Endogenous variables are those determined within the system of equations, and exogenous variables are determined outside the system. The number of equations in a model is determined by the number of endogenous variables. Employment rates and foreclosure rates are the endogenous variable, and a two equation model is developed. In order for a system of equations to be valid, they must meet identification criteria. The system of equations developed were:

3) Employmentrate = f(logforeclosurerate, stategdp, manufvhightech, changemanufjobs, belowpovline, bachelorsdegree, meantraveltime, hispanic)
4) Logforeclosure = f(typeforeclosure, medincome, medincomewithmortgage, bachelorsdegree, medtaxrate, sq1949, sq1950, sq1970, sq1990)

One method to detect simultaneity is the Hausman specification test. This test captures the residuals of an OLS regression with one of the suspected endogenous variables as the regressand. These residuals are then used as a regressor in a regression where the other endogenous variable is the regressand. If these residuals are statistically significant, then simultaneity is present in the model. In the presence of simultaneity, two-stage least squares (2SLS) is used to estimate the model. Based on the results of the Hausman specification test, the economic health model suffers from simultaneity, and 2SLS is used to estimate the model. These results will be discussed in more detail in Chapter 5.

This chapter described the methodology used to construct the two regression models used in this report. Although there were some shortcomings involving the data and the construction of the models, none represent serious limitations. The following two chapters present the results of the empirical analyses.

Endnotes

[1] "OMB Bulletin No. 10-02," December 1, 2009, http://www.whitehouse.gov/sites/default/files/omb/assets/bulletins/b10-02.pdf.
[2] "About Foreclosure Response," *Foreclosure-Response.org: Resources for Preventing Foreclosures and Stabilizing Communities*, accessed October 4, 2012, http://www.foreclosure-response.org/about_us.html.
[3] "Metropolitan Delinquency and Foreclosure Data, September 2012," *Metropolitan Foreclosure and Mortgage Delinquency Rates from Foreclosure-Response.org*, accessed April 1, 2013, http://www.foreclosure-response.org/maps_and_data/metro_delinquency_data_tables.html.
[4] Rob Pitingolo, "Serious_Delinquency_Rates_December2012.pdf," *Foreclosure-Response.org: Resources for Preventing Foreclosures and Stabilizing Communities*, accessed April 1, 2013, http://www.foreclosure-response.org/assets/maps&data/Serious_Delinquency_Rates_December2012.pdf.
[5] Immergluck, "Neighborhoods in the Wake of the Debacle," 7.
[6] American Community Survey Office, "When to use 1-year, 3-year, or 5-year estimates," accessed November 1, 2012, http://www.census.gov/acs/www/guidance_for_data_users/estimates/.
[7] Pitingolo, "http://www.foreclosure-response.org/assets/maps&data/Serious_Delinquency_Rates_December2012.pdf."
[8] "Metropolitan Foreclosure and Mortgage Delinquency Rates from Foreclosure-Response.org," *Foreclosure-Response.org: Resources for Preventing Foreclosures and Stabilizing Communities*, accessed October 4, 2012, http://www.foreclosure-response.org/maps_and_data/metro_delinquency_data_tables.html.

[9] "Metropolitan Delinquency and Foreclosure Data, September 2012."
[10] Pitingolo, "http://www.foreclosure-response.org/assets/maps&data/Serious_Delinquency_Rates_December2012.pdf."
[11] "Metropolitan Delinquency and Foreclosure Data, September 2012."
[12] "Export Nation," *The Brookings Institution*, accessed February 8, 2013, http://www.brookings.edu/research/interactives/export-nation.

Chapter 4: The Causes of Foreclosures

This chapter addresses the following research question: what factors contribute to the widely varying foreclosure rates seen across the 100 largest MSAs? The foreclosure prediction model aims to answer this question, and provides clarification on the causes of foreclosures. This model will also set the foundation for determining the impact of foreclosures on urban economies.

THE VARIABLES USED IN THE FORECLOSURE PREDICTION MODEL

As discussed in the previous chapter, the literature suggests that there are three main categories of variables to include when examining foreclosures: variables describing neighborhood qualities, variables describing the housing stock, and variables describing the homeowners themselves. The table below presents the descriptive statistics for the variables used in the foreclosure prediction model.

Variable	Mean	Standard Deviation	Minimum Value	Maximum Value	Category of Analysis
Fcrate	5.6898	2.961046	1.79	18.63	N/A
DVReg1	.08	.2726599	0	1	N/A
DVReg2	.13	.3379977	0	1	N/A
DVReg3	.13	.3379977	0	1	N/A
DVReg4	.06	.2386833	0	1	N/A
DVReg5	.29	.456048	0	1	N/A
DVReg6	.11	.314466	0	1	N/A
DVReg7	.04	.1969464	0	1	N/A
DVReg8	.16	.3684529	0	1	N/A
Typefc	.46	.5009083	0	1	N/A
Unemployed	6.39	1.473846	0	10.8	F/SE
BelowPovLine	10.632	3.474638	5.4	31.5	F/SE
Medincome	53,926.42	9,520.05	32,533	87,653	F/SE
Medincomewithmort	78,802.77	13747.22	52,193	127,101	F/SE
Africanamer	12.923	10.07362	.5	47.9	F/SE
Hisp	15.803	16.5807	1.3	90.6	F/SE
Bachelorsdegree	29.567	6.279035	14.3	47.3	F/SE
Rooms	5.587	.338044	4.7	6.2	H
Housevaluewithmort	218,967	105,144.6	96,600	632,700	H
Medhousecost	4,141.74	14780.89	1074	104,290	H
Sq1949	460.6152	523.5827	1	2371.69	H
Sq1950	524.1906	256.5112	57.76	1246.09	H
Sq1970	963.4146	391.5987	282.24	1949.223	H
Sq1990	988.006	722.0458	125.44	3,994.24	H
Medtaxrate	2,576.8	1,273.837	789	6,986	N
Pop2011	1,690,938	1,706,868	166,136	9,516,047	N
Popchange	138,252.5	242,116.9	-148,549	2,149,907	N

Table 3: Descriptive Statistics for the Foreclosure Prediction Model

A few statistics in the table are worth noting. First, the unemployment rate is 0 percent in the Bridgeport-Stamford-Norwalk CT MSA, accounting for the 0 minimum value in Table 3. This is highly unlikely, and almost certainly due to the way the variable was measured or calculated by the Census Bureau. Also, the Sq1949 variable has a minimum value of 1. This variable is calculated as the percent of houses built before 1949 squared. A review of the raw data shows that the MSA with this value is Las Vegas-Paradise, NV. While this is a fairly low percentage, it is most likely not a measurement error. Because the growth and development of the southwestern region of the U.S.

occurred fairly recently, it is not surprising that the housing stock is relatively new. Small portions of the housing stock would have been built before 1949. Finally, the descriptive statistics for regions two and three are identical. This occurred because the number of observations in both regions are equal. Since all observations will be entered as 1 for these binary variables, the descriptive statistics are identical.

EXPECTED RESULTS

Based on the literature, it is expected that foreclosure rates vary across regions in the country. That is, foreclosures are not equally distributed across the country. MSAs in the southeastern U.S., such as Miami-Fort Lauderdale-Pompano Beach, FL and Lakeland-Winter Haven, FL, have very high foreclosure rates. On average, the MSAs in the southeast have an average foreclosure rate of 7.18 percent. In contrast, the MSAs in this sample that are located in the Plains region, (this region includes North Dakota, South Dakota, Minnesota, Iowa, Kansas, and Missouri) have on average the lowest foreclosure rate in the sample, 3.37 percent. Given these regional differences, it is expected that these binary variables will be statistically significant.

The foreclosure type variable is another binary variable in the model that captures the type of foreclosure process. As discussed earlier, there are two different processes, judicial and statutory. It is expected that a judicial process should result in a lower foreclosure rate.

The financial/socio-economic variables in this model are used to control for varying levels of socio-economic and financial attainment across different MSAs. A priori, it is expected that increases in both median income variables and the percent of the population with a bachelor's degree or higher would all cause a decrease in foreclosure rates. Conversely, we would expect that as the percent of the population in an MSA

composed of Hispanics and African Americans would result in increasing foreclosure rates. These groups are more likely to receive adjustable rate mortgages, meaning that their likelihood of being foreclosed upon increases. It is also expected that the unemployment and poverty variables would cause foreclosure rates to increase.

The variables included in the housing quality category take into account differences in the housing stock across MSAs. The most important variables in this category capture the age of the housing stock. Newer housing stock is expected to have higher foreclosure rates. The more recently built a house is, the more likely its purchase will be financed with risky financial instruments.

The neighborhood quality variables include population, population change, and the median real estate tax rate. Including the population variables is important because they ensure that MSAs of different sizes will be treated equally in the regression. The median real estate tax is important because high tax rates also place a downward pressure on housing values, and decreasing property values can result in higher foreclosure rates.

PRESENTATION OF THE FORECLOSURE PREDICTION MODEL

The table below presents the saturated version of the foreclosure prediction model, and indicates the beta coefficients and t statistics. The dependent variable is the log of the foreclosure rate, and all coefficients are included in the model. The full output can be found in Appendix C.

	logfcrate
dvreg1	0.084 (0.97)
dvreg2	0.022 (0.26)
dvreg3	0.076 (1.21)
dvreg5	0.072 (1.12)
dvreg6	-0.100 (-1.35)
dvreg7	0.070 (0.93)
dvreg8	0.021 (0.27)
Typefc	0.138 (4.06)**
Unemployed	0.025 (2.10)*
Belowpovline	-0.003 (-0.48)
Medincome	0.215×10^{-4} (2.85)**
medincomewithmort	-0.205×10^{-4} (-3.78)**
Africanamer	0.003 (1.34)
Dvhisp	-0.042 (-0.94)
bachelorsdegree	-0.010 (-2.22)*
Rooms	-0.153 (-1.91)
housevaluewithmort	2.7×10^{-7} (0.76)
Medhousecost	-4.86×10^{-7} (-0.73)
sq1949	0.174×10^{-3} (2.35)*

Table 4: Estimating the Log of the Foreclosure Rate (Saturated Version)

Table 4, Continued

sq1950	0.202×10^{-3} (2.03)*
sq1970	0.196×10^{-3} (3.02)**
sq1990	0.104×10^{-3} (2.29)*
Medtaxrate	0.494×10^{-4} (2.31)*
pop2011	1.04×10^{-8} (1.39)
Popchange	2.61×10^{-8} (0.81)
_cons	1.347 (3.15)**
R^2	0.74
N	100

* $p<0.05$; ** $p<0.01$

DISCUSSION OF RESULTS

The R^2 value in this model suggests that about 74 percent of the foreclosure rate variation can be explained by these independent variables. The model is statistically significant overall, as evidenced by the F statistic of 11.27. Out of the 25 independent variables in the analysis, 10 are statistically significant. This model does not appear to suffer from major OLS violations (see Appendix D).

One of the most surprising results from this model is the insignificance of all the regional dummy variables. Both the research literature and media reports suggest that there is a strong regional force that influences foreclosure rates. In this analysis, region four was dropped because it had the lowest foreclosure rate (3.37 percent). Upon discovering the insignificance of these variables, a variety of steps were taken. Numerous restricted least square tests were conducted. In addition, alternate categorizations and an extension of the spatial submarket theory were attempted. (See Appendix E for the details of these procedures.) Determining regional categorizations are important for explaining

foreclosure rate variation, and are also necessary to avoid problems of model misspecification.

There are several possible explanations for the insignificant regional categorizations. First, it is possible that the sample of MSAs selected for analysis is not adequately representative of the population. The logic behind this argument lies in the construction of the model—the sample was not a simple random sample. Instead, the 100 largest MSAs on the basis of population were chosen. But since the majority of the country's population lives in the 100 largest MSAs, this sample is an inclusive and representative one. Alternatively, there may be another way to categorize cities. For instance, dividing cities in categories on the basis of their economic function (political, trade, or industrial) may have produced statistically significant results.

Finally, in this model it is possible that the variables capturing the age of the housing stock are picking up the regional dummy variables' variation. That is, the variation explained by the regional dummy variables is being captured by other variables. This would suggest that the similarity of an MSA to other MSAs located nearby, and not state-level similarities, is the important defining quality to serve as a basis for categorization.

The type of foreclosure process is highly significant in this model, but the sign is incorrect. The results suggest that having a judicial foreclosure process causes increasing foreclosure rates. This is counter-intuitive and this result is not supported in the literature. A possible explanation for this is that lenders are more experienced and prepared to handle court proceedings than a typical homeowner, resulting in more positive outcomes for mortgage lenders.

In the financial/socio-economic status category, the unemployed variable, both income variables, and the bachelor's degree variable were statistically significant.

However, the variables measuring the overall median income in an MSA and the poverty level display unexpected signs. We would expect that as the overall median income in an MSA increases, foreclosures decrease. Conversely, we would expect that as the percent of the population living below the poverty line increases, foreclosures would also increase, not decrease as the regression output suggests. Another unexpected finding from this analysis is the insignificance of both of the Hispanic and African American variables.

The majority of the literature examining foreclosures within a single city finds that racial breakdowns are significant variables. However, a study examining foreclosures across the 75 largest MSAs also finds that areas with larger minority populations do not have statistically significant rates of real estate owned properties (this term refers to a property that is owned by the bank because the entire foreclosure process is completed).[1] This indicates that while race may have an effect on foreclosures for an individual homeowner, the racial composition of a city does not impact foreclosures rates of an MSA.

Within the housing quality category, only the variables capturing the age of the housing stock were significant. Following the convention seen in the literature, these variables were squared in order to reflect the non-linear effect of age. In general, these variables suggest that the older housing stock will have more foreclosures.

The only statistically significant variable in the neighborhood quality category was the median real estate tax. The regression results shows that increasing the median real estate tax increases the foreclosure rate, but by a very small amount.

UNSATURATED VERSION OF THE FORECLOSURE PREDICTION MODEL

The table below shows the beta coefficients and t statistics for the final version of the foreclosure prediction model. This model excludes all insignificant variables, with the exception of the African American and Hispanic variables. See Appendix F and G for more details on this model.

	Logfcrate
typefc	0.143 (4.59)**
unemployed	0.041 (3.97)**
medincome	0.158×10^{-4} (2.85)**
medincomewithmort	-0.134×10^{-4} (-3.06)**
africanamer	0.003 (1.97)
dvhisp	-0.121 (-2.46)*
bachelorsdegree	-0.009 (-1.94)
sq1949	0.242×10^{-3} (4.23)**
sq1950	0.339×10^{-3} (3.56)**
sq1970	0.344×10^{-3} (5.11)**
sq1990	0.167×10^{-3} (3.64)**
medtaxrate	0.54×10^{-3} (3.17)**
_cons	-0.082 (-0.42)
R^2	0.63
N	100

* $p<0.05$; ** $p<0.01$

Table 5: Estimating the Log of the Foreclosure Rate (Unsaturated Version)

Generally, the results of this table mirror the results of the saturated regression model. The R^2 value, while lower than the saturated model, still indicates that over half of the variation in foreclosure rates is being explained. Like the saturated model, this regression model is also statistically significant on the basis of an F test.

The results indicate that if there is a judicial foreclosure process, then the log of the foreclosure rate increases by 0.14. As discussed above, it is expected that judicial foreclosure processes should lower foreclosure rates.

Within the financial/socio-economic category, the variable measuring bachelor's degree attainment or higher levels of education becomes insignificant. Another noteworthy finding in this model is that Hispanic dummy variable is significant, but the sign is unexpected, indicating that high percentages of Hispanics in an MSA will cause foreclosure rates to decrease. Like in the saturated model, the income variables are both statistically significant, but their signs suggest different impacts on foreclosure rates. As mentioned above, it is expected that increasing income rates result in lowered foreclosure rates.

In the housing quality category, the variables capturing the age of the house of the housing stock indicate that newer housing stock should have lower foreclosure rates. This is an unanticipated result because newer housing stock, is more likely to be financed with subprime loans, which will cause high foreclosure rates. This is the case in cities like Phoenix, AZ, and these types of financial instruments may be a source of increased vulnerability for cities.

The only significant variable in the neighborhood qualities category is the property tax rate. The results indicate that increasing tax rates results in increasing foreclosure rates. A possible explanation is that high tax rates place an additional

financial burden on an already overextended family, thus resulting in missed mortgage payments.

LIMITATIONS OF THE MODEL

One limitation of the model is the possibility of excluded independent variables, but given the R^2 value of 0.63, this is not a serious limitation. Ideally, one variable in the financial/socio-economic category would include a measure of subprime mortgages issued, because these mortgages are associated with a high probability of foreclosure. However, this variable was not accessible, and was omitted from the model. While there may be other missing variables in the model, this one is the most concerning.

Another limitation concerns the study's design. Ideally, an individual homeowner would be the unit of analysis, allowing the effects of homeowner characteristics to explain foreclosures.[2] However, this data were not available. Aggregating data to an MSA level means that we run the risk of arriving at conclusions that are then applied to individuals, even if the conclusions do not exist at the individual level. This problem is called the ecological fallacy. Another advantage of individual level data is that it allows for the possibility of aggregating upwards, thus providing more flexibility for analytical purposes. But data at the aggregate level cannot be disaggregated to the individual level. However, these limitations are not serious enough to invalidate the results of the model.

ALTERNATIVE PRESENTATION OF THE FORECLOSURE PREDICTION MODEL

As the analysis above shows, many different factors need to be considered, simultaneously, when examining foreclosures and it difficult to assess exactly what factors are at work. An alternate approach to explaining the complex effects of foreclosures is to create hypothetical cities, allowing only certain variables of interest to vary, and observing how the foreclosure rate changes.

Table 6 allows only income levels to vary, and holds all other variables constant. The low or high income values were found by multiplying the beta coefficient by the 25th or 75th percentile, respectively. The variables being held constant were calculated by multiplying the beta coefficient and the mean, and sum of these values for all variables being held constant is indicated in the other constant column of the table below. The middle housing stock variable was created by combining the 1950 and 1970 housing stock variables. The regression constant in the table is the constant in the regression output.

	Income With Mortgage		**Race**		**Age of Housing Stock**			**Regression Constant**	**Other Constant**	**Predicted Foreclosure Rate**
	High	Low	DVHisp	African American	Old	Middle	New			
City A	-1.14	N/A	-0.02	0.035	0.11	0.25	0.16	-0.08	1.054	**1.44**
City B	N/A	-0.92	-0.02	0.035	0.11	0.25	0.16	-0.08	1.054	**1.81**

Table 6: Cities With Varying Income Levels

City A and City B differ only in respect to their median income levels. City A has a high median income level, and City B has a low median income level. As expected, cities with high income levels experience lower foreclosure rates, although the difference is not as large as expected.

Table 7 allows the percentage of African Americans to vary. Since the Hispanic variable is a binary variable, it was not allowed to vary, and like other variables, its value was calculated as the beta coefficient times the mean. City C has a high percentage of African Americans, calculated by multiplying the beta coefficient by the 75th percentile

value. City D has a low percentage of African Americans, calculated by multiplying the beta coefficient by the 25th percentile value.

	Income with Mortgage	Race		Age of Housing Stock			Regression Constant	Other Constant	Predicted Foreclosure Rate
		DVHisp	African American	Old	Middle	New			
City C	-1.05	-0.02	.05	0.11	0.25	0.16	-0.08	1.054	**1.6**
City D	-1.05	-0.02	.01	0.11	0.25	0.16	-0.08	1.054	**1.5**

Table 7: Cities With Varying Percentages of African Americans

Table 7 suggests that there is a very small difference in foreclosure rates when the percentage of the population that is African American is allowed to vary. This is not surprising given that this variable is insignificant in the regression model. In general, the research literature does not support this finding, although there are a few exceptions.

The effects of the housing stock's age is assessed in Table 8. Each time frame, when allowed to vary, was calculated by multiplying the beta coefficient by the 75th percentile value. City E has a high portion of old housing stock. City F has a high portion of middle-aged housing stock, and City G has high portion of new housing stock.

	Income with Mortgage	Race		Age of Housing Stock			Regression Constant	Other Constant	Predicted Foreclosure Rate
		DVHisp	African American	Old	Middle	New			
City E	-1.05	-0.02	0.035	0.18	0.25	0.16	-0.08	1.054	**1.70**
City F	-1.05	-0.02	0.035	0.11	0.32	0.16	-0.08	1.054	**1.69**
City G	-1.05	-0.02	0.035	0.11	0.25	0.21	-0.08	1.054	**1.66**

Table 8: Cities With Varying Housing Stock Ages

The results from this table match the results of the regression model and show that the newest housing stock should have the lowest foreclosure rate. This is inconsistent with prior findings in the literature.

SUMMARY OF FINDINGS

Although the foreclosure prediction model provides reasonably strong statistical results, there are unexpected findings. In particular, the insignificance of the regional variables is suspect and perhaps related to the choice of metropolitan areas as the unit of analysis. This analysis indicates that the type of foreclosure process is highly significant, and plays an important role in the determining foreclosure rates. The type of foreclosure process a city faces might be a source of vulnerability. Finally, the unemployment rate variable is highly significant, and explains variation in foreclosure rates. The significance of this variable is important because it provides justification for the use of employment rates as an instrumental variable in the economic health model, which is introduced in the next chapter.

Endnotes

[1] Immergluck, "Neighborhoods in the Wake of the Debacle," 4.

Chapter 5: The Economic Impact of Foreclosures

This chapter explores the following research question: what are the economic implications of foreclosures for urban economies? This analysis is important because it shows how cities respond to foreclosures, and the results can help determine whether foreclosures are a stressor on urban economies. If the results suggest that foreclosures are a stressor, this will have implications for economic vulnerability and resiliency.

THE VARIABLES USED IN THE ECONOMIC HEALTH MODEL

As discussed earlier, the variables in this model were divided into four main categories: economic indicators (E), human capital variables (H), density related variable (D), and control variables (C). The table below presents the descriptive statistics for the variables used in the economic health model.

Variable Name	Mean	Standard Deviation	Minimum Value	Maximum	Category of Analysis
Employmentrate	58.949	4.229084	49.6	69	N/A
Fcrate	5.6898	2.961046	1.79	18.63	E
StateGDP	622,798.8	583,744.5	51,585	1,958,904	E
Manufactjobs	8.135	3.178983	1.7	17.8	E
Manufvhightech	18.946	16.16166	1.5	74.6	E
Exportvalue	10.469	13.67647	.9	79.8	E
Exportprodjobs	37.928	53.12662	3.5	329	E
Changemanufjobs	-31.278	11.26166	-56	18.6	E
Belowpovline	10.632	3.474638	5.4	31.5	H
Bachelorsdegree	29.567	6.279035	14.3	47.3	H
Somecollege	21.592	2.91283	15.5	27	H
Highschoolgrad	27.513	4.722366	16.5	42.8	H
Pop2011	1,690,938	1,706,868	166,136	9,516,047	D
Popchange	138,252.5	242,116.9	-148,549	2,149,907	D
Meantraveltime	24.57	3.057876	18.5	34.7	D
Medincome	53,926.42	9,520.05	32,533	87,653	C
DVHisp	0.2	.4020151	0	1	C
AfricanAmer	12.923	10.07362	.5	47.9	C

Table 9: Descriptive Statistics for the Economic Health Model

EXPECTED RESULTS

It is expected that increasing foreclosure rates should have negative economic implications for urban economies. Foreclosed houses make minimal contributes to a city's tax base, but still use public resources. They also cause nearby property values to drop, resulting in lower tax revenue. They may also create economic uncertainty, and will almost certainly create neighborhood instability in the form of vacant or abandoned properties.

With the exception of the foreclosure rate variable, we would expect that the remaining variables in the economic indicator category would result in increased economic growth. State GDP is expected to increase economic growth because an MSA will be impacted by the state's economic situation. If a state's GDP is growing, we would expect an MSA to do the same. Both of the manufacturing variables would also be expected to increase economic growth. For some MSAs, manufacturing is a large source of employment, and can also help provide exports, both of which can stimulate economic growth.

Within the human capital variables, all the education variables are expected to increase economic growth. Having an educated workforce across all levels increases economic growth, perhaps because a highly educated workforce increases innovation and productivity, and as the literature shows, these are two components critical for economic growth.

In regards to the density category of variables, the two population variables are included primarily for control purposes, similar to the rationale in the foreclosure prediction model. The mean travel time variable is a measure of how many employment opportunities are realistically available to the MSA's population. We would expect that

as the mean travel time increases, employment rates should also increase because the labor force has access to more employment opportunities.

PRESENTATION OF THE ECONOMIC HEALTH MODEL

The initial estimation of this model used an OLS regression with the percent of the population employed as the dependent variable. The results of the OLS regression model, without correcting for any potential OLS violations or simultaneity, are presented below and the full results can be found in Appendix H.

	employmentratepercent
logforeclosurerate	-4.428 (-2.43)*
stategdp	-0.000 (-3.66)**
manufjobs	-0.062 (-0.62)
manufvhightech	-0.062 (-2.64)**
exportvalue	0.066 (0.57)
exportprodjobs	-0.015 (-0.53)
changemanufjobs	0.043 (1.63)
belowpovline	-0.267 (-1.42)
Bachelorsdegree	0.355 (2.20)*
Somecollege	-0.032 (-0.19)
Highschoolgrad	-0.019 (-0.11)
pop2011	2.41×10^{-7} (0.84)
Popchange	1.11×10^{-6} (0.76)
Meantraveltime	-0.253 (-1.70)
Medincome	0.109×10^{-4} (0.47)
Dvhisp	1.987 (1.74)
Africanamer	-0.045 (-1.36)
_cons	64.161 (4.28)**
R^2	0.71
N	100

* $p<0.05$; ** $p<0.01$

Table 10: Estimating Employment Rates Using OLS

Of particular importance is the fact that the foreclosure variable is significant in this model. This remains true regardless of whether the log of the foreclosure rate or foreclosure rate is used as an independent variable. The results from the table above suggest that foreclosures exert a downward pressure on employment rates.

However, as discussed in Chapter 3, this model probably suffers from simultaneity, and using Ordinary Least Squares to estimate the regression will result in unreliable beta coefficients. Therefore, a system of equations was developed:

1) Employmentrate = f(logforeclosurerate, stategdp, manufvhightech, changemanufjobs, belowpovline, bachelorsdegree, meantraveltime, hispanic)
2) Logforeclosure = f(typeforeclosure, medincome, medincomewithmortgage, bachelorsdegree, medtaxrate, sq1949, sq1950, sq1970, sq1990)

Equation 1 includes all significant variables from the OLS regression that explain economic growth. Equation 2 originates from and includes all variables that were statistically significant in foreclosure prediction model. The percent of the population that was unemployed, while statistically significant in the foreclosure prediction model, was not included in Equation 2 above to avoid correlation problems with the endogenous employment rate variable. Results from the Hausman Test suggest that simultaneity is present (see Appendix I). After verifying the identification requirements were met, 2SLS was used to estimate the regression. The full results of this model can be found in Appendix J.

DISCUSSION OF RESULTS FOR THE ECONOMIC HEALTH MODEL

Using the output from the 2SLS regression mode, we can see that a one unit increase in the log of the foreclosure rate causes the percent of the population that is employed in an MSA to drop by 5.24 percent, holding all else constant. A one unit increase in the employment rate causes the log of the foreclosure rate to drop by 0.04 percent. These relationships are as expected. They indicate that foreclosures have a negative impact on economic growth in a city. They also indicate that economic growth will decrease foreclosure rates.

However, the signs on the state GDP and the percent of very high tech manufacturing jobs are incorrect. We would expect that both of these variables would increase employment rates. As mentioned earlier, a city's economy does not operate in isolation from the state's economy. Furthermore, high tech jobs should be a source of employment, given the high demand of these goods.

The change in manufacturing jobs variable was calculated to be a negative number if the MSA lost jobs in this sector, and a positive number if the MSA gained jobs in manufacturing. Thus, the results tell us that a one percent increase in the manufacturing jobs in an MSA results in a 0.04 percent increase in employment rates. Manufacturing contributes to economic growth because assuming adequate demand, the goods created in the manufacturing sector can become a source of exports. Also, the manufacturing sector has high multipliers, meaning that it creates jobs in other sectors.

Within the human capital variables, the relationship between the poverty variable and the bachelor's degree variable are as expected. The poverty variable can be considered a proxy variable for socio-economic status, and the regression results show that as the poverty levels in a city increase, the employment rates will decrease. Supporting the results found in the literature, the bachelor's degree variable shows that

education contributes to higher employment levels. It is surprising, however, that the other education variables are not statistically significant. This finding differs from the literature.

SUMMARY OF FINDINGS

The economic health model establishes the mutual determination between foreclosure rates and economic growth and decline (measured by employment rates). The relationship between these two variables are as expected. Foreclosures represent a downward pressure on a city's economy. Increased economic growth can cause foreclosure rates to drop. Other variables that have an impact on economic growth rates include the percent of manufacturing jobs considered high tech and the percent change in manufacturing jobs. The implications of these findings will be discussed in more detail in the next chapter.

Chapter 6: Explaining Foreclosures and Their Effect on Cities

In addition to clarifying the factors that contribute to foreclosures, this report also attempts to explain the widely varying foreclosure rates in cities. Some cities, such the Bradenton-Sarasota-Venice, FL MSA experienced very high foreclosure rates. In contrast, cities such as the Austin-Round Rock, TX MSA did not. What specific factors account for these differences across MSAs? Next, recognizing the complexity of urban economies, it is likely that the ramifications of increasing foreclosures are not contained in the housing market, and will spill-over into other sectors of the urban economy. This report examines the economic implications of foreclosures. How does a city's economy respond to the pressures exerted by increasing foreclosure rates? The research literature generally, but not exclusively, tends to focus on the impacts of foreclosures within a single city. In contrast, this report takes a larger scope, and looks at the causes and economic impact of foreclosures in MSAs across the country. Finally, this report also explores what actions, if any, local authorities can take to mitigate the consequences of foreclosures.

To fully explore these issues, a conceptual framework developed in Chapter 1 will be applied. First, the role of foreclosures as a stressor is examined. In addition to allowing us to better understand the inherent nature of foreclosures, the concept of a stressor allows for the introduction of two closely related concepts: vulnerability and resiliency. The empirical results of Chapter 5 confirm that foreclosures are a stressor on urban economies. Through the application of stressors, cities face increased vulnerability and decreased resiliency.

FORECLOSURES AS STRESSORS

The results of the economic health model support the claim that foreclosures act as stressors at the MSA level. Foreclosures are statistically significant, and holding everything else constant, a one unit increase in the log of the foreclosure rate causes a 5.2 percent decrease in employment rates. In this report, stressors are considered one of many factors that result in negative economic outcomes for cities. Foreclosures and the decline of the housing market both contributed to the economic recession, but there are other explanatory factors. For instance, a tightening credit market, the collapse of the financial sector, and lax governmental oversight and regulation also played a role.

Would the recession have been as severe or prolonged had only foreclosures, and not these other compounding factors, been at work? While it is impossible to know with certainty the outcome of this counterfactual situation, it is possible to speculate. Modern city economies are highly complex and fragile. A downturn in the housing market would have ramifications in other sectors of the economy. This is especially true because the housing market decline was a prolonged process that occurred over an extended period of time. The housing market decline and increasing foreclosure rates resulted in a loss of wealth because the equity value of houses declined. Due to the loss of equity, there was less collateral and fewer financial resources are available for consumption and investment purposes. The consequences of this situation are twofold. Small businesses, which drive economies in some cities and are also sources of job creation, will lack assets to borrow money. This hinders the growth and proliferation of small businesses. Also, individual homeowners will be unable to sell their homes because they have negative equity. This means homeowners are locked into a specific labor market, and the labor force lacks mobility thereby reducing economic efficiency.

The reality of the recession is that numerous complex processes were at work and interacting with each other. The decline of the housing market interacted with other factors to cause an extremely severe recession. As the results of the economic health model indicate, factors such as a state's GDP, the portion of manufacturing jobs considered high tech, poverty levels, and educational attainment levels can also cause economic growth or decline. Therefore, it is possible to consider the housing market's decline, and the resulting surge in foreclosures a stressor that contributed to economic decline. In isolation, it is unlikely that foreclosures alone would have caused an economic downturn. But interacting with other factors, the conditions were just right for a severe economic downturn.

ASSESSING ECONOMIC VULNERABILITY

According to the results of the foreclosure prediction model, the type of foreclosure process in a state can have a large impact on the foreclosure rate. Previous research has shown that the judicial foreclosure process is lengthier. This additional time gives homeowners more opportunities to avoid going into foreclosure.

There are a variety of initiatives, many established by the federal government, that allow a homeowner to avoid foreclosures. For instance, the Hope Now Alliance was established by the Department of the Treasury and the Department of Housing and Urban Development (HUD) during the Bush administration. The main goal of this alliance, which included financial lenders, investors, housing counselors and loan servicers, is to reach out to distressed homeowners and help prevent foreclosures.[1] Another federal program, the Making Homes Affordable program, also provide a variety of options for homeowners, such as lowering monthly mortgage payments, or, providing alternate solutions to foreclosures for those who no longer want to own a house.[2] In 2009, the

Obama administration established the Home Affordable Modification Program, which helped with mortgage modifications, under the rationale that both homeowners and lenders benefit when a foreclosure is avoided.[3]

Finally, recognizing that foreclosures impact the surrounding communities, the federal government created the Neighborhood Stabilization Program. This program provides grants to state and local communities with the goal of alleviating the negative societal repercussions stemming from foreclosures.[4]

However, increasing the length of the foreclosure process causes increased economic uncertainty for homeowners and urban economies. There is increased economic uncertainty because the status of many houses is unclear, and increasing the length of the foreclosure process only increases this economic uncertainty. This economic uncertainty might hinder public spending, because city officials are uncertain about incoming real estate tax revenue, which is one of the main sources of revenue for a city. Homeowner spending would also likely be curtailed. Also, this economic uncertainty may cause the housing market to function improperly, resulting in housing market instability.

Some might argue that one solution to preventing foreclosures, and thus decreasing a city's economic vulnerability is to encourage states to adopt judicial foreclosure processes. However, city officials have limited influence over this policy decision. Cities and states have made some attempts to combat increasing foreclosure rates and thus decrease their vulnerability. Some states have developed legislation to address high cost loans, and have created statewide consumer education campaigns and hotlines for homeowners.[5] In a more extreme example, California's San Bernardino county is considering using eminent domain to seize houses that are underwater, and then sell the houses to investment banks, who would allow homeowners to lower their

monthly mortgage payment, and avoid losing their home.[6] But given the scope and severity of the housing market decline, it is unlikely that these efforts will be adequate, and to some extent a city's vulnerability to foreclosures and the housing market decline is beyond its control.

Cities and states are dependent on the actions of the federal government. Housing finance is mostly legislated and regulated at the national level, and this centralization of government powers can be a source of increased vulnerability for cities. Given the regulatory structure of the mortgage market, decentralizing mortgage regulatory responsibilities to subnational governments is an infeasible and unrealistic approach that would likely create more disorder and problems than it solves. As was the case in the 1990s housing market crisis, decentralizing regulatory authority to states can be problematic especially if state governments lack the necessary regulatory policy levers. Due to the regulatory structure of housing finance, and the concentration of federal powers at the regulatory level, city officials have limited authority and capacity to undertake measures to mitigate the negative implications of high foreclosure rates.

Thusfar, this chapter has established that foreclosures are a stressor that exert downward pressure on urban economies. Due to the application of the stressor, cities face increased vulnerability when foreclosure rates are high. Cities also have limited resiliency because oftentimes local authorities do not have the policy levers that can affect foreclosure rates in a city.

DEVELOPING ECONOMIC RESILIENCY[v]

Given the limited options local authorities have to address rising foreclosure rates, how can cities maintain or develop economic resiliency and competitiveness in the

[v] The facts in this subsection regarding Pittsburgh and its economy were taken from a paper written during the 2011-2012 academic year.

context of stressors such as foreclosures? Empirical results from the second structural equation in the economic health model suggest that increasing economic growth can result in decreased foreclosure rates. A one percentage point increase in employment rates results in a 0.03 unit decrease in the log of the foreclosure rate. This section assesses three alternative mechanisms to enhancing economic growth: attracting industries with high multipliers, developing a specialization, and avoiding public policy decisions that create path dependency.

The empirical results from the economic health model show that high tech manufacturing jobs result in decreasing employment levels. However, this result is not supported by the literature, and generally manufacturing is a driver of economic growth. This should be especially true for high tech manufacturing. Manufacturing is a large source of exports, and as established earlier by the economic base theory, exports are a source of economic growth. The manufacturing sector tends to pay high wages, which has multiplier effects in the local economy. A multiplier is a measurement that determines the linkages and impact of an industry on other sectors of the economy. For every 100 jobs in the manufacturing sector, 2.91 jobs are created elsewhere in the economy.[7] In comparison, every 100 jobs in the business services and retail trade sectors create 1.54 and 0.88 jobs respectively.[8] The variable that measures the percent change in manufacturing jobs between 2000 and 2010 support these findings in the literature. This variable suggests that a one percent increase in manufacturing jobs between 2000 and 2010 results in a 0.04 percent increase in employment rates, indicating that manufacturing jobs are a source of economic growth.

Given that manufacturing jobs have positive economic impacts, perhaps cities should attempt to lure manufacturing companies to their city in order to promote economic growth. Some strategies involve providing financial or other types of

incentives for companies to open branches within a city or nurturing a labor force that attracts the manufacturing sector. However, not all cities can successfully implement these strategies. In addition, if city officials focus exclusively on attracting industries with high multipliers, they risk attaining a specialization in this sector.

Although beyond the scope of the empirical analyses presented here, a commonly accepted view in the literature is that extremely high specialization levels can be problematic. Specialization in one sector means that a city may have to import goods from other sectors, and a high dependency on imports from other regions may be another source of vulnerability. Also, elasticity of demand from regions beyond the city will determine the magnitude of demand for exported goods. Should external demand decrease, the region specializing in the exported good will suffer economically.

In an increasingly globalized world, global competition results in increased competition to dominate the export market. Detroit, for example, specialized in automobile manufacturing. As foreign competitors gained more of the market share, and demand for domestically produced automobiles dropped, Detroit's economy suffered tremendously.

Some of the cities that suffered the most from foreclosures, such as Phoenix, AZ and Las Vegas, NV had economies that relied very substantially on population growth and, therefore, specialized in the housing industry. At the peak of the housing bubble, more than 25 percent of the economies of Phoenix and Las Vegas were concentrated around the real estate, housing and construction industries; in essence, housing was the center of these urban economies.[9] As the populations of these cities grew, city governments saw increased revenue levels, and public spending soared. But housing is not a particularly resilient industry, and when the housing bubble burst, not only did the housing industry collapse, but all related industries also collapsed. In addition to the

housing decline, the economic decline eroded many retirees savings, and the city began operating on a deficit.[10] Thus, if foreclosures are stressing a city's economy, sufficient economic diversification may help decrease economic vulnerability and increase resiliency. However, adequate economic diversification makes agglomeration economies, which the literature has shown to be a source of economic growth, harder to attain.

Perhaps one option to ensuring economic resiliency and developing economic competitiveness is to avoid establishing a path dependency that locks a city into a situation that produces poor long term results. As defined in Chapter 1, path dependence is a series of cumulative decisions that force a system down one path or another, thus making the system's future more predictable.[11] However, it should be noted that in some instances, path dependence can cause positive outcomes. But this was not the case in Pittsburgh, PA. Pittsburgh's economy historically specialized around the steel industry. In the early 1970s, with the deindustrialization of the US and the rise of more efficient steel producers abroad, the steel industry in the US collapsed. The devastation from the collapse of the steel industry was immense. Unemployment rates in the region reached over 18 percent, and over 200,000 were unemployed.[12]

After the collapse of the steel industry, local authorities attempted to orient the economy around the service sector, resulting in large law firms, architecture companies, financial firms, and other industries concentrating in the area. Today, eight Fortune Five Hundred companies are located in Pittsburgh.[13] The region also attracts entrepreneurs through programs such as Innovation Works, which was designed to lure start-up companies to the area by providing financial support.[14]

City officials also strategically diversified the city's economy. Drawing on the strengths of Carnegie Mellon University and the University of Pittsburgh, the city began to attract technology firms such as Google, Microsoft, and Intel. The medical sector has

also become a driving economic force in the region, and it is possible to speculate that local public policy decisions have helped foster the higher education and medical sectors, and these sectors are known to cause economic growth.

Although these strategies will not impact foreclosure rates in cities, they may result in increased economic growth. As suggested by the results of the economic health model, increased economic growth will reduce foreclosure rates, and perhaps these strategies could mitigate some of the negative economic ramifications stemming from foreclosures.

CONCLUSION AND AREAS OF FURTHER EXPLORATION

The main goal of this report was to clarify the nature of foreclosures and explore their economic impacts. In order to do so, two empirical models were used. To explore these complex concepts in a manageable way, a conceptual framework consisting of stressors, vulnerability, and resiliency was developed. The application of a stressor such as a foreclosure can cause urban economies to experience increased vulnerability.

The results from the empirical analysis suggest that the foreclosure process in a state impacts the foreclosure rate. In addition, foreclosures exert a downward economic pressure on urban economies, as evidenced by the results of the economic health model. This regression analysis also finds that increased economic growth can result in decreased foreclosure rates. To a large extent, local authorities have limited policy levers that could affect foreclosure rates. The regulatory structure is based at the national level, and this is a source of vulnerability for cities. Given that the foreclosure rate is beyond the control of local officials, the remainder of the report looks at alternative options to increase economic resiliency and maintain or develop economic competitiveness.

The empirical analysis explores the causes of foreclosures in the 100 largest MSAs. A closely related question is to consider how cities with different economic structures respond to foreclosures. For instance, are the causes of foreclosures different in a city whose economy is centered around public administration (for instance a city that is a state capital) compared to an industry-oriented city? Ideally, any analysis that explores the causes of foreclosures would include a measurement of the percentage of subprime mortgages issued, but this variable is difficult to obtain, especially at the level of an MSA.

Adding a time dimension to this analysis would also be helpful. An ideal time frame is one that encompasses a period of economic growth, economic decline, and economic stagnation. The impact of foreclosures could be compared during these three time frames, and this would help clarify the role of foreclosures as a stressor.

Throughout this report, an MSA is the primary unit of analysis. The drawback to this approach is that an MSA, by definition, will include both a city center and in most instances, the surrounding suburbs. While it is appropriate to assume that an MSA is composed primarily of urbanized areas, there are alternative approaches that would allow an empirical analysis to focus more directly on cities. By selecting census tracts that are only within the city boundaries, and excluding those that are not, it would be possible to focus on the primary area of interest, a city.

A final approach that would allow for the option of focusing more directly on the cities is to use a case study approach. This approach is advantageous because it would allow for a less theoretical approach and would provide a realistic opportunity to evaluate the conceptual theories behind economic growth. A case study approach would incorporate city-specific efforts that are underway to develop economic resiliency, and would capture idiosyncratic features that empirical analyses do not.

The economic resiliency and competitiveness of a city is important because cities are drivers of national economic growth. The performance of a city's economy will have direct implications for regional and national economies. Stressors such as foreclosures can have negative economic implications for urban economies. Cities with resilient and competitive economies are likely to foster economic prosperity, on both a regional and national level.

Endnotes

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[2] "What Is 'Making Home Affordable' All About?," accessed March 22, 2013, http://www.makinghomeaffordable.gov/about-mha/faqs/Pages/default.aspx.
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[4] "Neighborhood Stabilization Program Grants/U.S. Department of Housing and Urban Development (HUD)," *U.S. Department of Housing and Urban Development*, accessed March 10, 2013, http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs/neighborhoodspg.
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[6] Jennifer Medina, "A County Considers Rescue of Underwater Homes," *The New York Times*, July 14, 2012, sec. U.S., http://www.nytimes.com/2012/07/15/us/a-county-considers-rescue-of-underwater-homes.html.
[7] Josh Bivens, *Updated Employment Multipliers for the U.S. Economy* (Washington, DC: Economic Policy Institute, August 2003): 3-4 http://www.epi.org/page/-/old/workingpapers/epi_wp_268.pdf.
[8] Ibid.
[9] Richard Florida, *The Great Reset: How the Post-Crash Economy Will Change the Way We Live and Work*, Reprint (HarperBusiness, 2011), 92.
[10] Ibid., 94.
[11] Pendall, Foster, and Cowell, "Resilience and Regions," 2.
[12] Christopher Briem, "For Pittsburgh a Future Not Reliant on Steel Was Unthinkable ... and Unavoidable," *Pittsburgh Post-Gazette*, December 23, 2012, http://www.post-gazette.com/stories/business/news/for-pittsburgh-a-future-not-reliant-on-steel-was-unthinkable-and-unavoidable-667484/.
[13] Harold Miller, "Regional Insights: It's Still Steel City, But Pittsburgh has Changed," *Pittsburgh Post-Gazette*, September 6, 2009 accessed March 12, 2012, http://old.post-gazette.com/pg/09249/995692-28.stm.
[14] "The Revival of Pittsburgh: Lessons for the G20, " *The Economist*, September 17, 2009, accessed March 19, 2012, http://www.economist.com/node/14460542?story_id=14460542

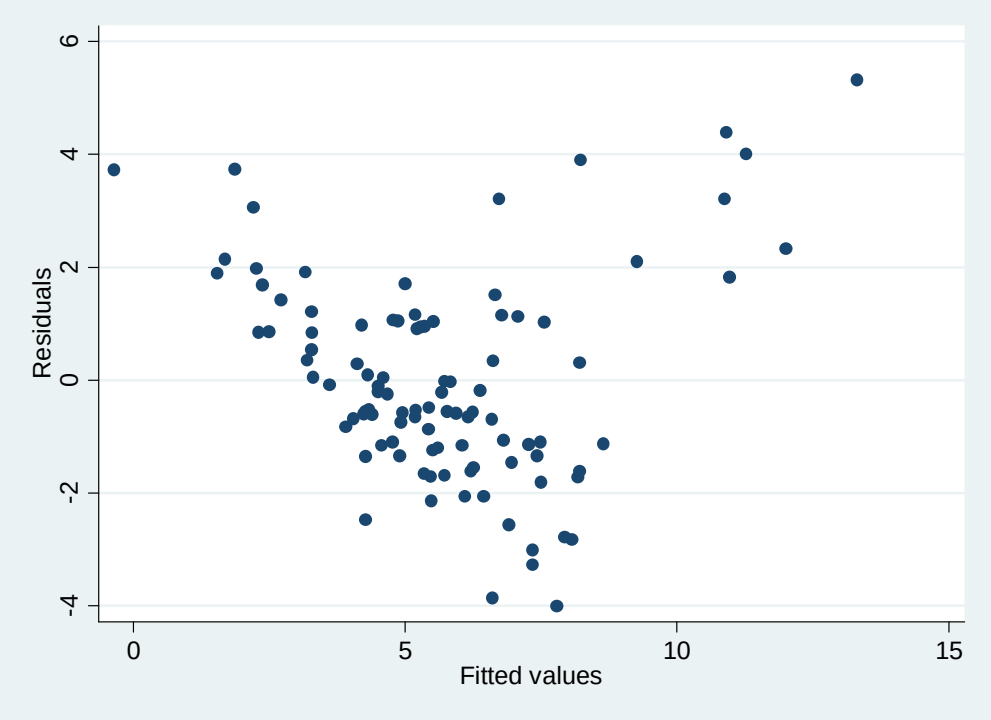
Appendices

APPENDIX A: BEA REGIONAL CLASSIFICATIONS AND AVERAGE FORECLOSURE RATES

New England Region (Region 1; Average Foreclosure Rate: 5.19 percent)	
Connecticut	New Hampshire
Maine	Rhode Island
Massachusetts	Vermont
Mideast Region (Region 2; Average Foreclosure Rate: 5.48 percent)	
Delaware	New Jersey
District of Columbia	New York
Maryland	Pennsylvania
Great Lakes Region (Region 3; Average Foreclosure Rate: 6.41 percent)	
Illinois	Ohio
Indiana	Wisconsin
Michigan	
Plains Region (Region 4; Average Foreclosure Rate: 3.37 percent)	
Iowa	Nebraska
Kansas	North Dakota
Minnesota	South Dakota
Missouri	
Southeast Region (Region 5; Average Foreclosure Rate: 7.18 percent)	
Alabama	Mississippi
Arkansas	North Carolina
Florida	South Carolina
Georgia	Tennessee
Kentucky	Virginia

Louisiana	West Virginia
Southwest Region (Region 6; Average Foreclosure Rate: 3.87 percent)	
Arizona	Oklahoma
New Mexico	Texas
Rocky Mountain Region (Region 7; Average Foreclosure Rate: 4.05 percent)	
Colorado	Utah
Idaho	Wyoming
Montana	
Far West Region (Region 8; Average Foreclosure Rate: 5.19 percent)	
Alaska	Nevada
California	Oregon
Hawaii	Washington

APPENDIX B: RESIDUAL PLOT OF THE FORECLOSURE RATE VARIABLE



APPENDIX C: RESULTS OF THE FORECLOSURE PREDICTION MODEL (SATURATED VERSION)

```
reg logfcrate dvreg1 dvreg2 dvreg3 dvreg5 dvreg6 dvreg7 dvreg8 typefc unemployed
belowpovline medincome medincomewithmort africanamer dvhisp bachelorsdegree rooms
housevaluewithmort medhousecost sq1949 sq1950 sq1970 sq1990 medtaxrate pop2011 popchange,
robust

Linear regression                                       Number of obs =     100
                                                        F( 25,    74) =   11.27
                                                        Prob > F      =  0.0000
                                                        R-squared     =  0.7409
                                                        Root MSE      =  .10457

------------------------------------------------------------------------------
             |               Robust
   logfcrate |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      dvreg1 |   .0841691   .0863829     0.97   0.333    -.0879526    .2562908
      dvreg2 |   .0220199   .0833975     0.26   0.792    -.1441533    .1881931
      dvreg3 |    .076225   .0630519     1.21   0.231    -.0494085    .2018586
      dvreg5 |   .0724559   .0648904     1.12   0.268    -.0568411     .201753
      dvreg6 |  -.1004089   .0742117    -1.35   0.180    -.2482789    .0474611
      dvreg7 |   .0703577   .0759606     0.93   0.357    -.0809971    .2217126
      dvreg8 |   .0212913   .0786632     0.27   0.787    -.1354486    .1780312
      typefc |   .1381961   .0340024     4.06   0.000     .0704449    .2059473
  unemployed |   .0248605   .0118133     2.10   0.039     .0013219    .0483991
belowpovline |  -.0030794   .0064118    -0.48   0.632    -.0158552    .0096964
   medincome |   .0000215   7.54e-06     2.85   0.006     6.48e-06    .0000365
medincomewithmort |  -.0000201   5.33e-06    -3.78   0.000    -.0000308   -9.53e-06
 africanamer |   .0028561   .0021323     1.34   0.185    -.0013926    .0071049
      dvhisp |  -.0417178   .0443833    -0.94   0.350    -.1301535    .0467179
bachelorsdegree |   -.009736   .0043813    -2.22   0.029     -.018466    -.001006
       rooms |  -.1531203   .0802244    -1.91   0.060    -.3129709    .0067302
housevaluewithmort |   2.70e-07   3.55e-07     0.76   0.449    -4.38e-07    9.79e-07
medhousecost |  -4.68e-07   6.44e-07    -0.73   0.470    -1.75e-06    8.16e-07
      sq1949 |   .0001739    .000074     2.35   0.022     .0000264    .0003214
      sq1950 |   .0002022   .0000994     2.03   0.045     4.18e-06    .0004002
      sq1970 |   .0001964   .0000651     3.02   0.003     .0000668    .0003261
      sq1990 |   .0001042   .0000456     2.29   0.025     .0000134     .000195
   medtaxrate |   .0000494   .0000214     2.31   0.024     6.72e-06    .0000921
      pop2011 |   1.04e-08   7.46e-09     1.39   0.169    -4.50e-09    2.52e-08
    popchange |   2.61e-08   3.21e-08     0.81   0.419    -3.78e-08    8.99e-08
        _cons |   1.347046    .427858     3.15   0.002     .4945207    2.199572
------------------------------------------------------------------------------
```

APPENDIX D: STATISTICAL SOUNDNESS OF THE FORECLOSURE PREDICTION MODEL (SATURATED VERSION)

In order to use a regression model for analytical purposes, it must be statistically sound. In this model, there is reason to suspect heteroskedasticity. The data is cross-sectional, and includes potentially heterogeneous observations (MSAs within the same country). In order to correct for heteroskedasticity, residual plots were examined to detect patterns. Apart from the dependent variable, the residual plots for all other variables showed white noise, indicating that the error's variance is constant. Furthermore, the log transformation of the dependent variable means that its scale is reduced by a power of ten. This helps lower heteroskedasticity. Estimate the regressions using White's robust standard errors also helps correct for the presence of heteroskedasticity.

Because the data are not time series, autocorrelation is not expected to be a problem. Any correlation between the error terms is more likely to be spatial autocorrelation, resulting from the fact that cities located near each other are more likely to be similar as opposed to cities located far away from each other. The Durbin Watson statistic for this model is 1.97, suggesting that serial and spatial autocorrelation are not present.

Multicollinearity occurs when independent variables are correlated with each other, and can be detected with a Variance Inflation Test. If the VIF is larger than 10, there is reason to suspect multicollinearity between two or more variables. In this case, the only two variables with VIF statistics substantially greater than 10 are the medincome and medincomewithmort variables (see below). These two variables measure the median income for those in an MSA with a mortgage and the overall median income in an MSA, so it is not surprising that they are closely correlated with each other. However, both

variables are statistically significant, meaning that they both working independently to explain variation in the foreclosure rate, and are not interacting with each other.

Variable	VIF	1/VIF
medincome	55.18	0.018122
medincomewithmort	53.39	0.018731
housevaluewithmort	11.89	0.084088
sq1949	11.70	0.085474
dvreg8	9.05	0.110440
dvreg5	8.56	0.116857
sq1990	7.80	0.128208
sq1970	7.58	0.131926
bachelorsdegree	6.27	0.159483
dvreg2	5.88	0.170126
dvreg6	5.76	0.173583
rooms	5.70	0.175480
medtaxrate	5.56	0.179849
sq1950	5.49	0.182306
belowpovline	4.89	0.204463
dvreg1	4.24	0.235919
dvhisp	4.05	0.247001
dvreg3	4.04	0.247757
africanamer	3.57	0.280482
dvreg7	2.47	0.405577
unemployed	2.30	0.434723
typefc	2.18	0.457836
pop2011	2.06	0.485341
popchange	1.62	0.617629
medhousecost	1.31	0.763021
Mean VIF:	**9.30**	

APPENDIX E: DETERMINING REGIONAL CLASSIFICATIONS FOR MSAS

A variety of strategies were employed to determine accurate regional groupings of the MSAs in the sample. First, a restricted least squares test was conducted. The purpose of this test is to determine whether two coefficients are statistically equal. The results of the test would indicate a statistically significant difference between the various regional groups. Numerous restricted least squares tests were conducted to compare different regions, and none of the calculated test statistics were significant. This suggests that there is no statistical difference between these regional groups, and for some reason, the Bureau of Economic Analysis method of classifying states does not contribute to explaining variation in foreclosure rates, and is not meaningful for the purposes of this analysis.

Second, different methods of categorizing were explored, primarily categorizing cities on the basis of median income level in an MSA, state unemployment rates, and state GDP levels. Within each category, numerous breakdowns were attempted. Estimation of multiple regressions with these different categories did not result in the statistical significance of the regional variables.

The final attempt to make the regional dummy variables significant involved an extension of the spatial submarket theory. This theory is typically applied within an individual city, and allows for the possibility that characteristics vary across space. By adding a geographical dimension, this theory allows for the fact that two neighborhoods within a single city located adjacent to each are more likely to be similar when compared to two neighborhoods at opposite ends of the city. These similarities suggest that spatial submarkets exist within a city.[vi] To control for these submarkets, researchers includes

[vi] Daniel Immergluck and Geoff Smith, "The External Costs of Foreclosure: The Impact of Single-Family Mortgage Foreclosures on Property Values," *Housing Policy Debate* 17, no. 1 (2006): 68.

five variables in their regression model: longitude, latitude, each of these variable squared, and the product of the longitude and latitude. Most often, these variables are significant, suggesting that spatial submarkets exist within a city. Extending this logic, it is very likely that geographical spatial submarkets exist within the U.S. But these five additional variables were insignificant in this analysis, indicating that within this sample, regional effects are not present.

APPENDIX F: RESULTS OF THE FORECLOSURE PREDICTION MODEL (UNSATURATED VERSION)

```
reg logfcrate typefc unemployed medincome medincomewithmort africanamer dvhisp
bachelorsdegree sq1949 sq1950 sq1970 sq1990 medtaxrate, robust

Linear regression                                       Number of obs =     100
                                                        F( 12,    87) =   12.17
                                                        Prob > F      =  0.0000
                                                        R-squared     =  0.6256
                                                        Root MSE      =  .11592

------------------------------------------------------------------------------
             |               Robust
   logfcrate |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     typefc |   .1426661   .0311052     4.59   0.000      .080841    .2044911
 unemployed |   .0411481   .0103658     3.97   0.000      .020545    .0617512
  medincome |   .0000158   5.53e-06     2.85   0.005     4.78e-06    .0000268
medincomewi~t |  -.0000134   4.36e-06    -3.06   0.003     -.000022   -4.69e-06
africanamer |   .0027413   .0013917     1.97   0.052    -.0000249    .0055074
     dvhisp |  -.1209239    .049173    -2.46   0.016    -.2186605   -.0231873
bachelorsde~e |  -.0089774    .004622    -1.94   0.055    -.0181642    .0002095
     sq1949 |   .0002415   .0000571     4.23   0.000     .0001281     .000355
     sq1950 |    .000339   .0000953     3.56   0.001     .0001497    .0005284
     sq1970 |   .0003439   .0000673     5.11   0.000     .0002102    .0004776
     sq1990 |   .0001668   .0000459     3.64   0.000     .0000756     .000258
 medtaxrate |    .000054    .000017     3.17   0.002     .0000202    .0000879
      _cons |  -.081572   .1955359    -0.42   0.678    -.4702208    .3070767
------------------------------------------------------------------------------
```

APPENDIX G: STATISTICAL SOUNDNESS OF THE FORECLOSURE PREDICTION MODEL (UNSATURATED VERSION)

On the basis of examining residual plots, heteroskedasticity is not expected to be a problem in this model. Using White's Robust Standard Errors helps eliminate any heteroskedasticity that might be present. Autocorrelation is also not expected to be a major issue, and the calculated Durbin Watson statistic is 1.91, meaning that autocorrelation is not present. The Variance Inflation Factor results below show that similar to the saturated model, the two median income variables are highly correlated with each other. However, this is also not a large source of concern.

Variable	VIF	1/VIF
Medincomewithmort	25.75	0.038833
Medincome	19.72	0.050702
sq1949	6.69	0.149586
sq1990	5.82	0.171834
sq1970	4.03	0.248079
Medtaxrate	3.99	0.250534
Sq1950	3.99	0.250701
Bachelorsdegree	3.87	0.258104
Dvhisp	2.51	0.398633
Typefc	1.66	0.600932
Africanamer	1.42	0.705842
Unemployed	1.35	0.743045
Mean VIF	6.73	

APPENDIX H: THE ECONOMIC HEALTH MODEL USING OLS

```
reg employmentratepercent logforeclosurerate stategdp manufjobs manufvhightech
exportvalue exportprodjobs changemanufjobs belowpovline bachelorsdegree somecollege
highschoolgrad pop2011 popchange meantraveltime medincome hispanic africanamer

      Source |       SS       df       MS              Number of obs =     100
-------------+------------------------------           F( 17,    82) =   12.28
       Model |  1271.21924    17  74.7776025           Prob > F      =  0.0000
    Residual |  499.410738    82  6.09037486           R-squared     =  0.7179
-------------+------------------------------           Adj R-squared =  0.6595
       Total |  1770.62998    99  17.8851513           Root MSE      =  2.4679

------------------------------------------------------------------------------
employmentratepe~t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------------+----------------------------------------------------------------
logforeclosurerate |  -4.658721   1.765279    -2.64   0.010    -8.170424   -1.147018
          stategdp |  -2.28e-06   6.57e-07    -3.47   0.001    -3.58e-06   -9.70e-07
         manufjobs |    .012751   .1058963     0.12   0.904    -.1979105    .2234126
    manufvhightech |  -.0652492    .022491    -2.90   0.005    -.1099909   -.0205075
       exportvalue |   .0653637   .1113084     0.59   0.559    -.1560641    .2867916
    exportprodjobs |  -.0149128   .0278158    -0.54   0.593    -.0702473    .0404217
   changemanufjobs |   .0548225   .0260642     2.10   0.038     .0029724    .1066726
      belowpovline |  -.4470399   .2008323    -2.23   0.029    -.8465593   -.0475205
   bachelorsdegree |   .4508297   .1660595     2.71   0.008     .1204844    .7811749
       somecollege |    .064035   .1711123     0.37   0.709    -.2763619     .404432
    highschoolgrad |   .1195952   .1806049     0.66   0.510    -.2396856     .478876
           pop2011 |   2.41e-07   2.95e-07     0.82   0.417    -3.46e-07    8.29e-07
         popchange |   1.11e-06   1.15e-06     0.97   0.336    -1.17e-06    3.39e-06
    meantraveltime |  -.3009949   .1474838    -2.04   0.044    -.5943872   -.0076025
         medincome |   .0000109   .0000692     0.16   0.875    -.0001268    .0001487
          hispanic |   .1087698    .042375     2.57   0.012     .0244724    .1930672
       africanamer |   .0002566   .0384738     0.01   0.995    -.0762799    .0767932
             _cons |   57.69519    15.0852     3.82   0.000     27.68593    87.70445
------------------------------------------------------------------------------
```

APPENDIX I: HAUSMAN TEST FOR SIMULTANEITY

```
reg employmentratepercent logforeclosurerate stategdp manufvhightech changemanufjobs
belowpovline bachelorsdegree meantraveltime hispanic, robust

Linear regression                                       Number of obs =     100
                                                        F(  8,    91) =   37.92
                                                        Prob > F      =  0.0000
                                                        R-squared     =  0.6992
                                                        Root MSE      =  2.4193

------------------------------------------------------------------------------
                   |               Robust
employmentratepe~t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------------+----------------------------------------------------------------
logforeclosurerate |  -4.801436   2.229654    -2.15   0.034    -9.230371   -.3725016
          stategdp |  -2.36e-06   5.37e-07    -4.40   0.000    -3.43e-06   -1.29e-06
    manufvhightech |  -.0639791   .0257148    -2.49   0.015    -.1150584   -.0128998
   changemanufjobs |   .0483205   .0226141     2.14   0.035     .0034003    .0932407
      belowpovline |  -.4823544     .13726    -3.51   0.001    -.7550046   -.2097042
   bachelorsdegree |   .3887517   .0624524     6.22   0.000     .2646977    .5128058
    meantraveltime |  -.1860885     .09653    -1.93   0.057    -.3778334    .0056565
          hispanic |   .0949224   .0323908     2.93   0.004     .0305821    .1592626
             _cons |   63.27691   3.132689    20.20   0.000     57.05421    69.49961
------------------------------------------------------------------------------

. predict employmentrate_res, res

. reg logforeclosurerate  employmentratepercent stategdp manufvhightech changemanufjobs
belowpovline bachelorsdegree meantraveltime hispanic employmentrate_res , robust

Linear regression                                       Number of obs =     100
                                                        F(  3,    90) =       .
                                                        Prob > F      =       .
                                                        R-squared     =  1.0000
                                                        Root MSE      =       0

------------------------------------------------------------------------------
                   |               Robust
   logforeclosurerate |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------------+--------------------------------------------------------------
employmentratepercent |   -.208271   2.30e-09 -9.0e+07   0.000     -.208271    -.208271
             stategdp |  -4.92e-07   5.94e-15 -8.3e+07   0.000    -4.92e-07   -4.92e-07
       manufvhightech |   -.013325   2.08e-10 -6.4e+07   0.000     -.013325    -.013325
      changemanufjobs |   .0100638   1.60e-10  6.3e+07   0.000     .0100638    .0100638
         belowpovline |  -.1004604   1.42e-09 -7.1e+07   0.000    -.1004604   -.1004604
      bachelorsdegree |   .0809657   1.05e-09  7.7e+07   0.000     .0809657    .0809657
       meantraveltime |  -.0387568   8.33e-10 -4.7e+07   0.000    -.0387568   -.0387568
             hispanic |   .0197696   2.82e-10  7.0e+07   0.000     .0197696    .0197696
   employmentrate_res |    .208271   2.12e-09  9.8e+07   0.000      .208271     .208271
                _cons |   13.17875   1.44e-07  9.2e+07   0.000     13.17875    13.17875
------------------------------------------------------------------------------
```

APPENDIX J: THE ECONOMIC HEALTH MODEL USING 2SLS

```
reg3 (employmentratepercent logforeclosurerate stategdp manufvhightech changemanufjobs
belowpovline bachelorsdegree meantraveltime hispanic) ( logforeclosurerate
employmentratepercent typeforeclosure medincome medincomewithmort bachelorsdegree
medtaxrate sq1949 sq1950 sq1970 sq1990), 2sls first

First-stage regressions
-----------------------

      Source |       SS       df       MS              Number of obs =     100
-------------+------------------------------           F( 15,    84) =   20.02
       Model |   1383.5409    15  92.2360599           Prob > F      =  0.0000
    Residual |  387.089082    84  4.60820336           R-squared     =  0.7814
-------------+------------------------------           Adj R-squared =  0.7423
       Total |  1770.62998    99  17.8851513           Root MSE      =  2.1467

------------------------------------------------------------------------------
employmentratep~t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
------------------+-----------------------------------------------------------
         stategdp |  -1.52e-06   5.47e-07    -2.77   0.007    -2.60e-06   -4.28e-07
   manufvhightech |  -.0421715   .0180282    -2.34   0.022    -.0780225   -.0063204
  changemanufjobs |   .0333116   .0237813     1.40   0.165    -.0139801    .0806034
     belowpovline |  -.5682157   .1598407    -3.55   0.001    -.8860765   -.2503548
  bachelorsdegree |    .388631   .0838255     4.64   0.000     .2219349    .5553271
   meantraveltime |  -.2588187   .0923603    -2.80   0.006    -.4424873   -.0751501
         hispanic |   .1334008   .0279463     4.77   0.000     .0778265     .188975
  typeforeclosure |   .6311525   .5588031     1.13   0.262    -.4800888    1.742394
       medincome |  -.0000101   .0001225    -0.08   0.935    -.0002536    .0002335
medincomewithmort |    .000046   .0000906     0.51   0.613    -.0001342    .0002261
       medtaxrate |  -.0002881   .0003858    -0.75   0.457    -.0010553    .0004791
           sq1949 |  -.0043146   .0011242    -3.84   0.000    -.0065502    -.002079
           sq1950 |   -.006964   .0017807    -3.91   0.000     -.010505   -.0034229
           sq1970 |  -.0071377   .0012178    -5.86   0.000    -.0095594   -.0047159
           sq1990 |  -.0018661   .0007226    -2.58   0.012    -.0033029   -.0004292
            _cons |   72.26619   4.866929    14.85   0.000     62.58777    81.94461
------------------------------------------------------------------------------

      Source |       SS       df       MS              Number of obs =     100
-------------+------------------------------           F( 15,    84) =    9.24
       Model |  1.94451297    15  .129634198           Prob > F      =  0.0000
    Residual |  1.17789774    84  .014022592           R-squared     =  0.6228
-------------+------------------------------           Adj R-squared =  0.5554
       Total |   3.1224107    99  .031539502           Root MSE      =  .11842

------------------------------------------------------------------------------
logforeclosurer~e |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
------------------+-----------------------------------------------------------
         stategdp |   1.71e-08   3.02e-08     0.57   0.572    -4.29e-08    7.71e-08
   manufvhightech |  -.0000712   .0009945    -0.07   0.943    -.0020489    .0019064
  changemanufjobs |   .0006483   .0013118     0.49   0.622    -.0019604    .0032571
     belowpovline |   .0070348   .0088173     0.80   0.427    -.0104994     .024569
  bachelorsdegree |  -.0080424   .0046241    -1.74   0.086    -.0172379    .0011531
   meantraveltime |    .025023   .0050949     4.91   0.000     .0148913    .0351548
         hispanic |  -.0046091   .0015416    -2.99   0.004    -.0076747   -.0015434
  typeforeclosure |   .1254483   .0308253     4.07   0.000     .0641488    .1867477
       medincome |   .0000123   6.76e-06     1.83   0.071    -1.10e-06    .0000258
medincomewithmort |  -.0000148   5.00e-06    -2.96   0.004    -.0000247   -4.87e-06
       medtaxrate |   .0000488   .0000213     2.29   0.024     6.49e-06    .0000911
           sq1949 |   .0002196    .000062     3.54   0.001     .0000963    .0003429
           sq1950 |   .0004056   .0000982     4.13   0.000     .0002103     .000601
           sq1970 |   .0003075   .0000672     4.58   0.000     .0001739    .0004411
           sq1990 |   .0001693   .0000399     4.25   0.000       .00009    .0002486
            _cons |  -.1132391   .2684747    -0.42   0.674    -.6471305    .4206523
------------------------------------------------------------------------------
```

```
Two-stage least-squares regression
------------------------------------------------------------------------------
Equation           Obs  Parms        RMSE    "R-sq"     F-Stat        P
------------------------------------------------------------------------------
employment~t       100      8    2.420299    0.6989      25.93   0.0000
logforeclo~e       100     10    .1336284    0.4910       9.32   0.0000
------------------------------------------------------------------------------

------------------------------------------------------------------------------------------
                     |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------------+--------------------------------------------------------------------
employmentratepercent |
   logforeclosurerate |  -5.244022   2.408568    -2.18   0.031    -9.996683   -.4913613
              stategdp |  -2.36e-06   5.17e-07    -4.56   0.000    -3.38e-06   -1.34e-06
       manufvhightech |  -.0632355   .0195475    -3.23   0.001    -.1018071   -.0246639
      changemanufjobs |    .047574   .0228682     2.08   0.039     .0024497    .0926984
         belowpovline |  -.4842228   .1316343    -3.68   0.000    -.7439677   -.2244779
      bachelorsdegree |   .3799105   .0776435     4.89   0.000     .2267019    .5331191
       meantraveltime |  -.1772184   .1017793    -1.74   0.083    -.3780524    .0236155
              hispanic |   .0935235   .0266839     3.50   0.001     .0408699     .146177
                 _cons |   63.64024    3.79891    16.75   0.000     56.14411    71.13637
---------------------+--------------------------------------------------------------------
logforeclosurerate    |
employmentratepercent |  -.0362188   .0098416    -3.68   0.000    -.0556385   -.0167991
      typeforeclosure |    .176688   .0331529     5.33   0.000     .1112696    .2421063
            medincome |   .0000191   6.31e-06     3.03   0.003     6.65e-06    .0000315
    medincomewithmort |  -.0000127   4.83e-06    -2.64   0.009    -.0000223   -3.20e-06
      bachelorsdegree |   .0048814   .0052648     0.93   0.355    -.0055072      .01527
           medtaxrate |   .0000148    .000019     0.78   0.435    -.0000226    .0000522
               sq1949 |   .0000579   .0000777     0.75   0.457    -.0000954    .0002113
               sq1950 |   .0000388   .0001311     0.30   0.767    -.0002199    .0002976
               sq1970 |   .0000121   .0000937     0.13   0.897    -.0001728     .000197
               sq1990 |   .0000766   .0000474     1.62   0.108     -.000017    .0001701
                _cons |   2.425051   .6041401     4.01   0.000     1.232943    3.617159
------------------------------------------------------------------------------------------
Endogenous variables:  employmentratepercent logforeclosurerate
Exogenous variables:   stategdp manufvhightech changemanufjobs belowpovline
     bachelorsdegree meantraveltime hispanic typeforeclosure medincome
     medincomewithmort medtaxrate sq1949 sq1950 sq1970 sq1990
------------------------------------------------------------------------------
```

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